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ARMY INFORMATION DIGEST

THE OFFICIAL MAGAZINE OF THE DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern. The Digest is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the Active Army, Army National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

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COVER: Armed with futuristic weapon and protected by body armor and thermal face mask, this prototype of Futur- army soldier by Army Exhibit Unit, Cameron Station, Virginia, keynotes the theme of this issue—MAN, the Indispensable and Ultimate Weapon of the Modern Army.

COMMAND LINE

Army Views On Vital Issues

ON LAND AND SPACE

"Despite the glamor of long-range missiles and the boundless challenges presented by the possibilities of space exploration opening before us, we must never lose sight of the fact that man's home and life are on the land, and he is capable of existing outside his natural environment only to the extent that he is able to create an artificial environment for the time being and take it with him. We must never lose sight of the fact that if man does not control the land to which he must return, man cannot exist indefinitely, either at sea, beneath the sea, in the atmosphere or outside of the atmosphere. The Army's interests and endeavors are therefore to use space to improve its capabilities to perform its vital mission of land combat and to defend the land from attack from any place, including an attack from the space above the land."

Secretary of the Army Wilber M. Brucker, before the House Committee on Science & Astronautics, 16 February 1960.

ON HUMAN WILL AND MILITARY STRENGTH

"In the wide tactical dispersion which would be characteristic of any battlefield today, . . . soldiers will have to fight in relatively small, comparatively isolated units. Such fighting places particular stress upon the human will, because men draw comfort in danger from the knowledge that they are not alone. This instinctive need is felt not only at the level of individuals but also at the level of units. In individuals, we see it displayed in the well known tendency of inexperienced troops to want to bunch up under fire. At the unit level, we recognize it in the special honor we do to organizations which have stood firm in spite of their isolation—organizations such as the "Lost Battalion" in World War I, and defenders of Bastogne in World War II.

"It is important to realize that, in modern war, the necessity for units to maintain unflagging determination and continue the fight despite isolation will not be exceptional, but quite commonplace. This fact alone places special demands upon the members of the Army for reserves of great spiritual and psychological strength."

General Lyman L. Lemnitzer, Army Chief of Staff at the Army Chaplains' Conference Washington, D. C., 18 January 1960.

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For courage, stamina, resourcefulness under stress,

Modern Army Needs MAN

SCARCELY fifteen years ago the Army's Manhattan Project opened the door to a new Atomic Age whose wonders we have hardly begun to comprehend. Almost before we had a foot across the threshold, a new door was suddenly thrown open, and the Nation took its first step into the Space Age.

Thus within our lifetime the American people are confronted with two momentous developments—nuclear power and penetration of the outer space frontier—which hold forth both peril and promise.

There are many who, overwhelmed with the marvels of this atomic, supersonic space age, would hurry to discard the conventional methods of defense and concentrate all efforts on an electronic, push-button, robot system of protection. In their haste, these individuals overlook the very basic elements on which all systems and organizations must ultimately build—the man himself.

For man is the ultimate weapon. His courage, stamina and judgment determine where, when and under what circumstances our mighty instruments of firepower shall be brought to bear. Without his alertness and unremitting efforts, the most advanced weaponry quickly deteriorates into rusting hulks of steel, rubber, plastic and lifeless circuits.

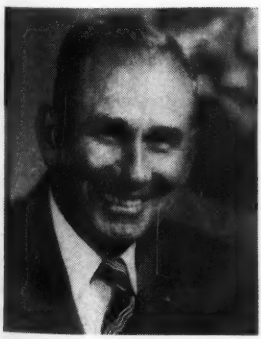
The most complex computer cannot match the wizardry of his brain—its capacity for judgment, discernment, decision. No machine, no mechanical assembly of wheels and tubes and wires, no contrived and controlled series of chemical reactions, no combination of scientific gadgets, however marvelous, will ever possess the human capacity for devotion, faith and courage beyond the call of duty.

These qualities, deeply bred in American hearts, have made our Nation great. They give direction and purpose to our soldiery. It is this spirit which makes of an ordinary aggregation of men a dynamic, purposeful, fighting organization—armed with conviction and imbued with the indomitable will to win. Only such a force, working as a team, can apply the precise degree of firepower to contain and root out aggression without destroying the fabric of civilization which that aggression threatens.

As General Lemnitzer, our Army Chief of Staff, has stated: "Man is and will remain the essential element in war. Men, not machines, win or lose the battle. Machines cannot wage war; they can only increase the effectiveness of man."

For sustained combat power in world-wide deployments,

MAN needs a Modern Army



Hugh M. Milton, II
Under Secretary of the Army

THE STRENGTH of the human spirit is paramount, but it must go forth properly arrayed and equipped with essential tools. Just as the craftsman's skill is projected by the tools he employs, so the soldier requires the latest improved means of firepower, communications and mobility to shape the course of future battle.

The American soldier requires superior armament, armor, wings, treads and wheels to enable him to meet the enemy in any terrain, overwhelm him under any conditions of climate, weather, or darkness, and dominate the land which is the source of the aggressor's power for evil.

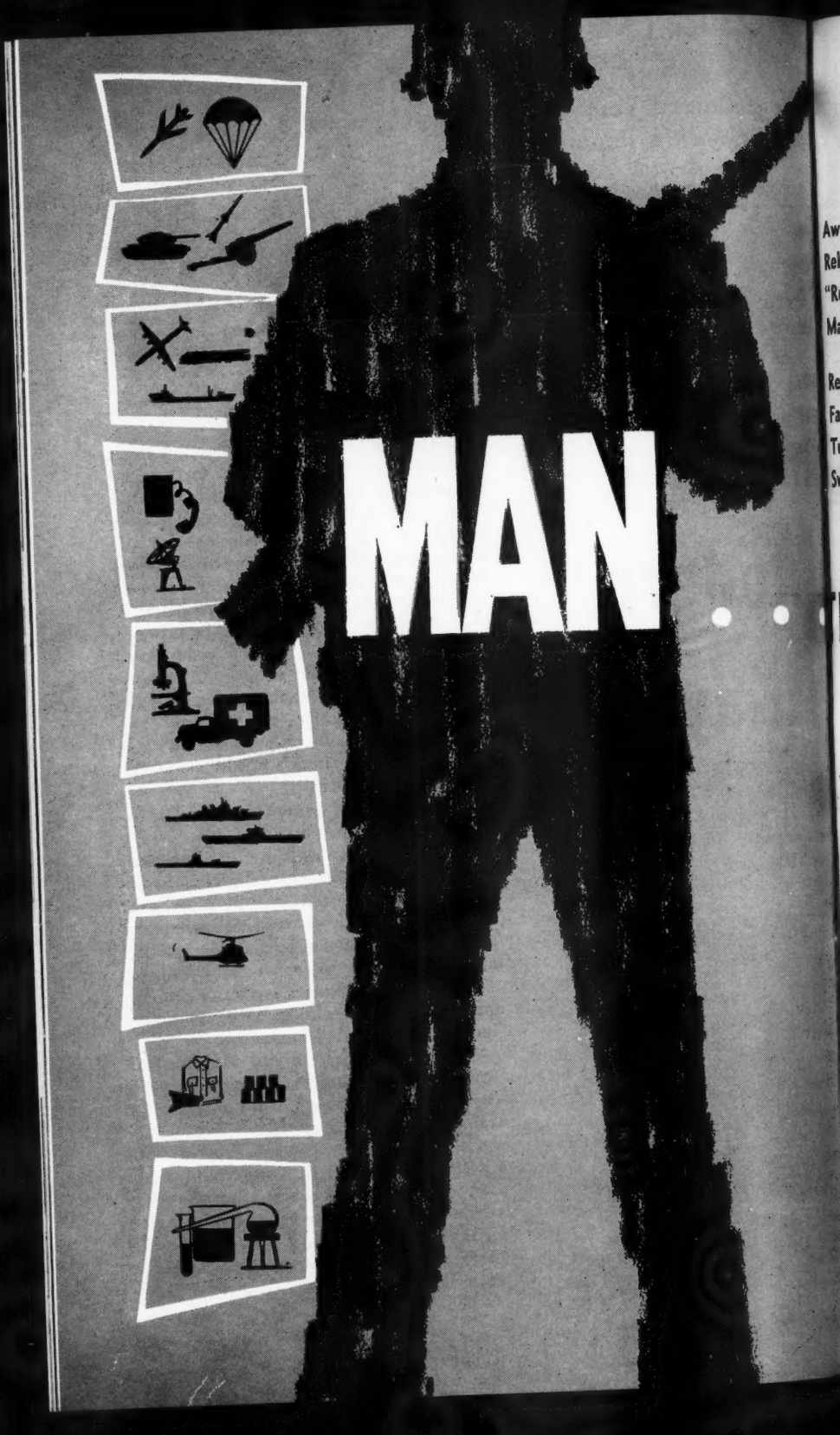
THE Modern Army Needs Man — trained, skilled, ready.

It also needs continually improved hardware, in sufficient quantities, to insure rapidity of movement, accuracy of fire, and flexibility of response in delivery and dispersal of forces and supporting materiel.

Man lacking modern materiel and organization becomes vulnerable to defeat on the battlefield of tomorrow.

Modern Materiel without Man, skilled, trained and resolute in its use, is similarly destined to become so much debris on the scrapheap of history.

Only the proper combination of Man suitably equipped with Modern Materiel and organized for instant response to the fast-moving conditions of warfare can give us the strength-in-being that means ultimate security for our Nation and the Free World.


MAN

Awaiting his turn to "stand up and hook up"—

Relieving the sentinel at the Tomb of the Unknowns—

"Running" the blood specimen at Brooke General—

Manning the machine gun overwatching the Demilitarized Zone or the Czech border station—

Readying the Hercules outside metropolitan Detroit—

Fathoming the mysteries of atomic warhead assembly—

Tuning the L-20's motor at Davison Army Air Base—

Swinging the tube "on target" at Grafenwohr—

THE ESSENTIAL INGREDIENT

Lieutenant Colonel John E. Lance

BASICALLY, what is this man? Who is he? How did he arrive at his present job? Is he a breed peculiar to this modern age? Or does he belong to all ages—and foreshadow the advent of space as the frontier soldier of the seventies presaged the coming of ground mechanization?

Actually, he is an everyday example of the kid next door—an average guy doing a man-sized job in his Army role.

This is the basic soldier—basic these days only in that he is a new soldier. His component? Chances are he's a Regular Army soldier—almost three of every four on active duty are. But whatever his source — Regular, draftee, Reservist or Guardsman on two years active duty or six months active duty for training—he is a SOLDIER in the United States Army.

WHERE does he come from? You name it—Prescott, Arizona; Sneedville, Tennessee; McKee's Rocks, Pennsylvania; Hometown, USA! His geographical origin and his social and economic antecedents run the gauntlet from farm boy to mayor's son, mill hand's offspring or scion of the VP of a newspaper chain, one who has known only plenty or one who has known the raw ache of hunger, draftee or vol-

LIEUTENANT COLONEL JOHN E. LANCE, General Staff, is assigned to the Enlisted Procurement Branch, Procurement Division, Office of the Deputy Chief of Staff for Personnel.

unteer. He is all these—and more.

He is the Jones brat next door who suddenly shows up rock-ribbed, six-feet, and home on his first leave following basic training before you realize he has departed even the tree-climbing stage.

Or he is the Thomas kid farther up the street—headed for the ministry, but first fulfilling an obligation. He volunteered for induction —didn't have to, really—but it's more than a debt he owes his country. He considers it as a very demanding and real preliminary to his life's work. He wants a close look at his fellow man—and himself. But not as a career soldier—only for two years.

Then there's the Caldwell kid in the 900 block, now undergoing six months active duty for training as a Guardsman and then into the local unit—a unit which hails back to the militia days of old when national emergency threatens, but which also serves as a very present aid in time of local disaster or crisis. The Caldwell kid's choice calls for smaller doses for greater intervals. There's good logic to that, both from his standpoint as he paves the way for uninterrupted study at the local college of veterinary medicine, and also for the Guard, which will keep a fine citizen on its readiness rolls.

MANY of today's young soldiers choose the initial Regular Army enlistment as a step to further training—giving an extra year's service for guaranteed training in a technical or semi-technical field that they probably never would have quit reached on their own.

Or their motives may be as complex as the Jones kid following completion of his parachute training and airborne assignment. He still not sure why he volunteered most likely he wanted to see how it was. That silken canopy that he's now seen open with eye-popping but satisfying suddenness over his head for the tenth time represents a pretty big accomplishment for a kid, even one who last year sat Greenville's all-state end flat on his back and sprang the Albright youngster for 93 yards. The prospect of a second stripe has him just

The indomitable, aggressive spirit of individual Man, the Ultimate Weapon, is epitomized by this statue erected at Fort Dix, N. J.

Every day examples of "the kid next door" become tough, self-reliant soldiers under Army training, as these paratroopers on recent field maneuver.

about convinced now—but he had to check it for size first. This service life is a pretty intricate pattern after all!

In this respect he's no different from other volunteers. Probably only one in four initial enlistees have given the service career more than a passing thought—even when repeating the oath, with right hands lifted, at the Dallas, Miami, or Butte Recruiting Main Stations. Again there are as many reasons behind his being in the Army as there are social or economic ties. But you can bet he's no hoodlum; he hasn't faced the judge and heard the "enlist or else" ultimatum. Time was, perhaps, but not now.

His motive for enlistment, for volunteering for induction, or for simply letting his number catch up with him is a solid motive—not a whim that sends him suddenly from his eleventh grade classroom in a fit of pique to the recruiting station. For if he had, he would have been told to get that diploma, then return and he would be welcome.

THIS soldier of today has more education than any previous soldier. Approximately sixty-five percent of Regular Army volunteers in the past six months have a high school or better education. No applicant for Regular Army enlistment who falls into the lower two of the five mental categories is acceptable. And even though three of ten draftees have "tested out" in the next to the lowest of the five mental categories, their trainability in at least two aptitude areas has been established prior to induction. More brainpower than ever before? No question about it!

This fact is especially appreciated by the young soldier himself. The maxim "quality begets quality" rings true. There is a notable absence of comic books in glove compartments, to say nothing of the fact that courts-martial and

Man—The Essential Ingredient

AWOL's have reached an all-time low—and church attendance, an all-time high. It isn't coincidence that the Army now maintains only one disciplinary barracks.

IS HE as physically strong as he is mentally bright? Doubtful, initially. Today's typical youngster, with the exception of the true athletic type, leads a soft life amid the labor-saving marvels of an ease-inducing standard of living. Lack of individual, family, and civic interest in physical fitness is reflected in the make-up of youngsters to whom the physical rigors of basic training are somewhat more than a rude shock.

But how does he emerge? Fit as a fiddle, heavier, and with a physi-

A program of research and development provides individual soldier with best in equipment like this new M14 rifle.

During rugged field training, latent physical powers and ability materialize, and the young man emerges "fit as a fiddle, heavier, with physical capacity he never dreamed of."

cal capability he never dreamed of. So again, the young man who has met the physical qualifications for induction or enlistment demonstrates his versatility. Latent physical powers and ability materialize as the youngster pounds out his first march to bivouac to the strident cadence count of his platoon sergeant.

First-class in every respect, serving for a variety of motives, intelligent, morally sound, physically fit –can you ever place him in a pattern and say "here he is — the American soldier"? Only by recognizing him as a diversified composite as different as his background and training—as incapable of being classified into an all-in-

Strict overseer of all his charges do or fail to do, experienced NCO provides both a watchful eye and steady hand in leading men.

The individual soldier is soon merged into a larger group, learning the value of teamwork, developing aggressive spirit.

Varied skills are demanded in modern Army. Here Chemical Corps soldier monitors equipment before making aerial radiation survey.

clusive pattern as is a single snowflake, despite its outward similarity to the others.

WHAT does the Army do with him? Where does the Prescott citizen wind up? How about the youngster from McKee's Rocks?

Two of three Regular Army soldiers sign up for a specific commitment at enlistment—perhaps for training as infantryman or aircraft

Rocket launcher, popularly called bazooka, in background provides heavy firepower that backs up the rifleman.

During field maneuver that toughens his body, keeps his mind alert, teaches him use of modern Army equipment and teamwork with other units, the soldier may have to take his meal where and when he can.

"What about his superior—the NCO? Maybe a more mature Jones, he accepts responsibility and adversity with the shrug of a leader's shoulders."

mechanic, Military Policeman, finance clerk or parachutist. Assignment is carefully monitored. Every possible safeguard is taken to insure that the promise made by the recruiting sergeant is honored completely, and that the talents of every soldier are utilized or developed to the maximum possible extent. The drafted youth with professional training readily fits in at the Signal Lab in Monmouth or as a personnel psychologist in one of the seventy examining stations scattered the length and breadth of the United States.

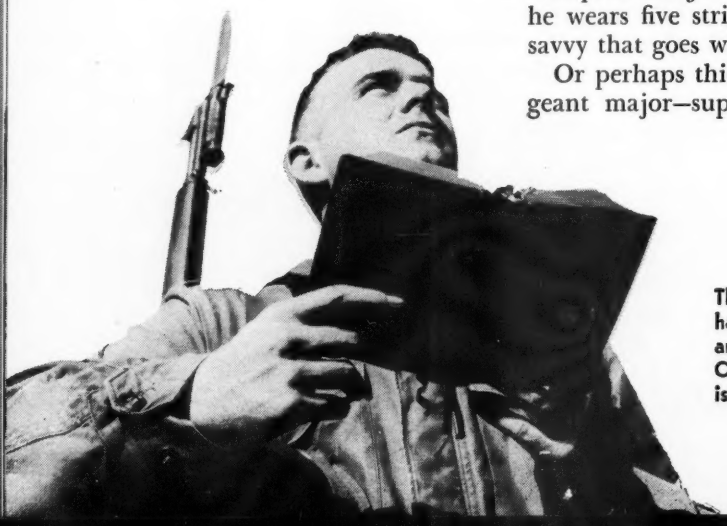
Under Reenlistment Central Assignment Plan, young soldier at left learns he is accepted for school before he reenlists. Right, sergeant operates record-keeping machine.

A chance at advanced schooling or on-the-job training in a variety of fields is available to all. Advancement is limited only by the youngster's initiative and capabilities. Approximately 12,500 soldiers completed their tour or initial enlistment in grade E-5 during Fiscal Year 1959—not bad for a two- or three-year hitch!

This, then, is our young soldier —a veritable gold mine of potential, improving daily in capability and motivation.

WHAT about his superior—the NCO? Any basic difference? Not really. Maybe a more mature Jones by virtue of his twelve years' service, the platoon sergeant is strict overseer of all that his forty-odd charges do or fail to do. He accepts responsibility and adversity with the same shrug of capable shoulders — a leader's shoulders. But he's still Jones—seasoned probably by exposure to more than one Communist "human sea" attack in Korea when death hung close—but nonetheless the same cut, the same stamp, as the Jones kid. Only now he wears five stripes—and has the savvy that goes with them.

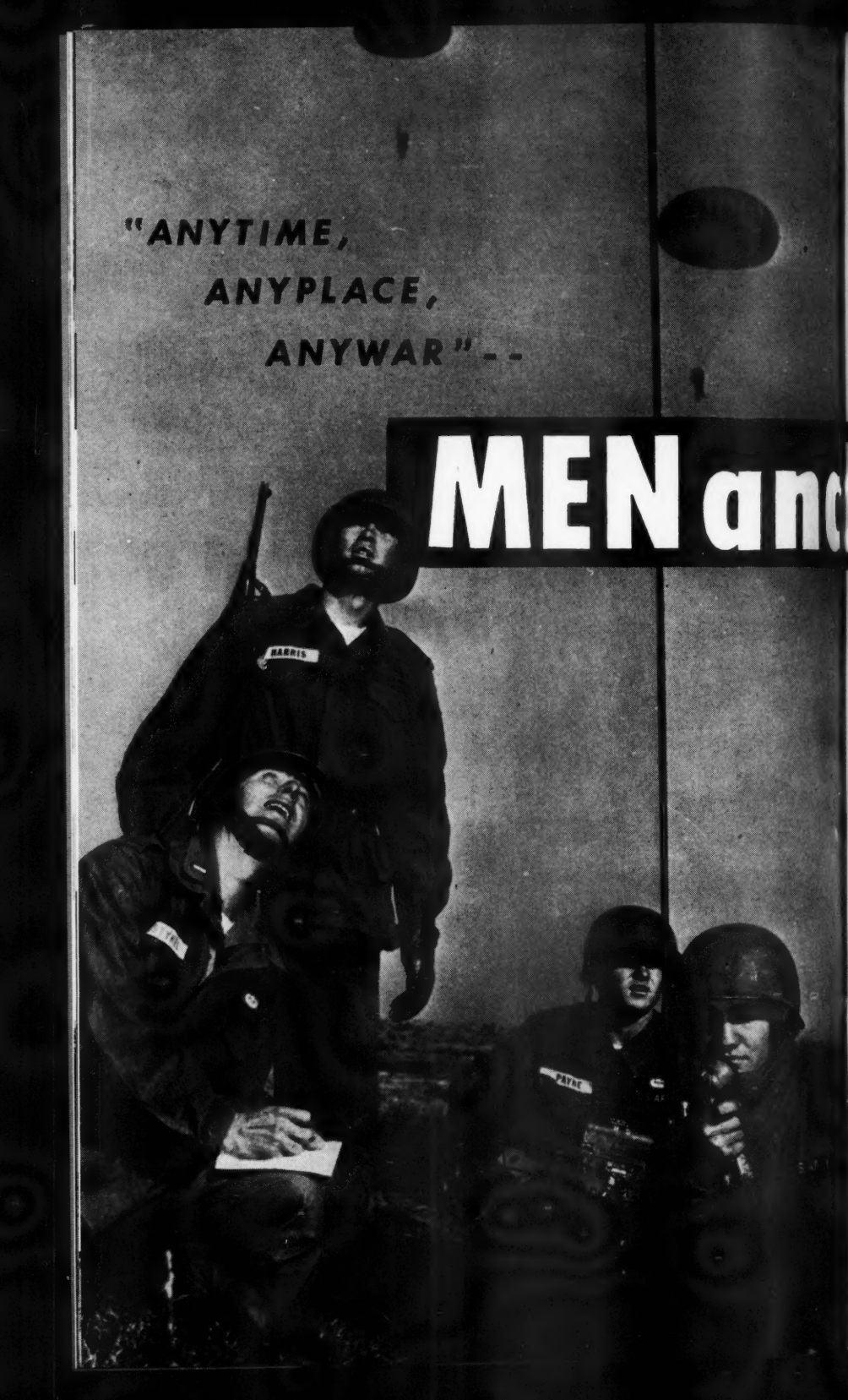
Or perhaps this NCO is the sergeant major—supremely proud of



The soldier of today has more education than any previous soldier. Church attendance, too, is at an all-time high.

his E-9 chevrons and the acknowledged status that accompanies them. Any different from PFC Jones or SFC Jones? Little, if any –with the exception that he has seen two wars and that he probably steered SFC Jones through basic. This sergeant major knew the "old Army." He has, both silently and vociferously, prayed for its return many times, if only for an instant. But underneath he knows that this is a better Army–that there has never been anything to compare with today's Army, its missiles, tanks, aircraft and riflemen.

He knows, in the wisdom of twenty-five years' service—of looking at countless Joneses, Thomases, Caldwells—that today's Jones and contemporaries provide him raw material unequalled in the annals of any army—smarter, more versatile and more capable than ever before. And he knows, too, as he steadies and directs these men, that here, in the final analysis, the Hercules would never take the air, the machine gun would never chatter, the Beaver's prop would never turn over, and the M-48 tube would never swing on target without that essential ingredient in war of this or any age—MAN.


"ANYTIME,
ANYPLACE,
ANYWAR"--
MEN and
HARRIS
PATHE

LIEUTENANT GENERAL JOHN C. OAKES
Deputy Chief of Staff for Military Operations,
Department of the Army

MISSIONS--

THE ARMY'S TASKS

THE only suitable symbol of the Army is the soldier. Ships and planes may epitomize the Navy and the Air Force, but only the soldier can reflect what the Army is and what it does. Yet by their very nature, the Army's tasks today are too broad to be represented by a single individual. The combat soldier is, of course, of fundamental importance, but he is only the cutting edge of a very complex machine. The wheels and belts and the power source are all essential to drive the cutting edge. Thus, the Army can only be depicted as the composite of several soldiers.

SFC BLACK a tank section commander in the 14th Armored Cavalry Regiment, stationed in Fulda, Germany, belongs to a unit which maintains surveillance over a sector of the East German border. It is the eyes and ears of the Seventh Army Commander. Should East German or Soviet forces in East Germany attack, Sgt. Black might well be the first person to feel the blow, to sound the alarm, and to resist the enemy.

His unit mans observation posts along the Iron Curtain and also conducts reconnaissance patrols daily. Periodically it rehearses and tests its alert plans, "scrambling" from barracks, sometimes in dead of night, into vehicles and on to one or more of the road blocks which it would man and defend

against any invader. Always it trains — sharpening its individual and team skills, keeping its equipment in top operating condition, participating in full-scale combat maneuvers—always ready.

PFC BROWN a rifleman in the 1st Battle Group, 506th Airborne Infantry Regiment, stationed at Fort Campbell, Kentucky, is a qualified parachutist who has made 23 jumps. His unit must be prepared to move on short notice to any one of the many trouble spots around the world. Pfc Brown's combat equipment — the most modern available in the Army —is packed and ready to go. Even his nonessential personal belongings are assembled and inventoried, ready to be placed in storage.

Here readiness is the watchword, as the Group trains to maintain and improve its rapid-reaction capability. Planning, instruction and rehearsal are never-ending, for the Group must be prepared to move and to fight in an almost infinite combination of situations — alone or as part of a larger force; with or without existing bases in the destination area; air-dropped or air-landed; in winter or summer; and in the many combinations of climate and terrain to be found in areas of possible employment world-wide.

SP 5 WHITE is a radar operator in a Nike-Hercules battery on site in Quincy, Massachusetts. The battery is part of the surface-to-air missile defense guarding the Boston-Providence area which includes most of Rhode Island, half of Massachusetts, and significant portions of Connecticut and New Hampshire. Its defense must be operational night and day.

Sp 5 White's battery mans equipment around the clock and maintains in the battery area an alert group which can place the unit in full operation if need be. The unit's task is a sensitive one, requiring a high degree of skill and judgment. Whenever unidentified planes enter its area of responsibility, each must be tracked by radar as missile launching crews prepare for engagement. Thus far, all intruders have been ultimately identified as friendly. But constantly, the defense must be vigilant and fully prepared for the possibility that next time a truly hostile aircraft may approach.

CPL BLUE a member of the Korean Military Advisory Group, is assigned as a small arms advisor at the Infantry School maintained by the Korean Army (ROKA) at Kwangju. The instructors here, as at other ROKA schools, are Koreans. The corporal and fellow members of his advisory detachment teach the instructors.

Cpl. Blue's knowledge of assembly and disassembly, operation, care and repair of rifles, machine guns and mortars is imparted through Korean instructors to Korean Army students. The students then return to their units where they transmit that knowledge to front-line soldiers. Here one sees the fundamental concept of mutual security at work. The link between United States knowledge and Free World readiness to resist Communist encroachment is apparent.

MR. GREEN is one of three employees in a civilian TV repair shop in Winner, South Dakota. Drafted during the Korean

Many and varied are the missions of Army troops today. Communications is vital area requiring highly trained personnel.

War and trained at Fort Monmouth, New Jersey, he spent his entire term of service in the States as a radio repairman. Upon discharge, he enlisted in the Army Reserve. The Signal company of which he is a member is listed among the Army ready reserve units. It trains two hours each week, and annually in July it moves to a Minnesota camp for two weeks of active duty service. At the time of the Lebanon crisis, the company was alerted for return to active duty but was not actually recalled.

Today Mr. Green is a civilian in the eyes of his neighbors, but to the Army he is a soldier. He trains regularly, stands ready to serve, and has a prime role in Army plans.

SO diverse are these individuals, the places and nature of their work, that they seem to fall into no pattern and to have little in common. Actually, the unifying factor is that all contribute to the accomplishment of the Army's mission. Each represents one of the major categories of forces that the Army maintains in order to discharge its responsibilities.

Deployed Forces

HEADING the list are the Army's oversea deployments, illustrated by the tank section com-

Safeguarding against nuclear effects, Chemical Corps team traces radioactivity contours from radio-relayed information.

Constant training, as by crew of jeep-mounted recoilless rifle, keeps soldiers of all components ready for any emergency that arises.

mander in Germany. It could just as well have been an infantry rifleman in the main battle position in Korea, or the artillery observer at his side, or any one of thousands of others in the Far East and Europe who may be separated from Communist arms by only a few yards of earth or a political boundary.

Deployed Army forces consist of eight divisions with necessary service and combat support units. Seven of the divisions are deployed along the Sino-Soviet periphery, serving as undeniable evidence to an aggressor that a forward movement into the defended areas will be promptly checked by American military strength, be it in general or limited war. As proof of their effectiveness, not a single Communist aggression has been initiated in range of U. S. Army weapons.

Not only do Army forces overseas contribute materially to the defense of Western Europe and the Far East, but they also enhance the morale of the people whose country they protect. These forces are tangible proof of our Nation's dedication to the principle of collective security and of the willingness of the American people to share the hazards and sacrifices of living in proximity to Communist military power.

These men on the ground constitute a guarantee—far more convincing than our pledges or our machines — a guarantee to our allies that we will fight at their side should aggression occur. The term "interdependence" has real meaning to the U. S. soldiers deployed along the Iron and Bamboo Curtains and to the citizens of the countries in which they serve.

Readiness Force

THE paratrooper from Fort Campbell represents the Strategic Army Force, a CONUS-based strategic reserve of combat divisions and separate units. This force constitutes visible strength in being to remind any aggressor that, in a short span of time, a significant United States military force can be committed in any part of the world.

The Strategic Army Corps (STRAC) is the combat-ready striking element of the Strategic Army Force. STRAC must be capable of moving promptly to reinforce our oversea deployments in case they are attacked or, alternatively, to move into areas of actual or potential conflict where U. S. forces are not now stationed but where the presence of our ground forces may come to be in the national interest.

In addition to STRAC, the Strategic Army Force includes the STRAC Reinforcement, three active divisions which serve as a training base and provide fillers for STRAC and for oversea units. Moreover, in the event STRAC units were deployed overseas these three divisions would provide the means for reconstituting the strategic striking force.

The major elements of STRAC are the Headquarters of XVIII Airborne Corps and three divisions—101st Airborne, 4th Infantry and 82d Airborne. Because STRAC includes both the necessary combat and support units, it is capable of putting division forces into the field, not just divisions, and these forces can be tailored to fit the

During maneuvers that test troop readiness, infantrymen watch artillery burst in attack on simulated enemy village in Germany.

As part of training that keeps troops in Germany in constant state of combat readiness, infantry soldiers stage assault on "enemy"-held house.

requirements of a situation as it actually develops. Accordingly, a STRAC force deployed into an area of crisis can sustain itself and conduct extended ground operations. Moreover, with two airborne divisions in the troop list, STRAC forces can be employed in areas where other forces can not be used.

Air Defense

A MAJOR contribution to the general war deterrent is made by the air defense elements of the Army assigned to the continental defense of the United States. Sp 5 White personifies this force. The Army has, in being, substantial resources in facilities, trained personnel, operational units, and research and development programs which enter into this contribution. The product of all this effort is the protection provided important industrial and communications centers as well as military installations, including bases of the Strategic Air Command.

Air defenses around key locations greatly increase the cost to the enemy of any attempt to attack them. Furthermore, these defenses are necessary to insure that our retaliatory capability survives enemy attack in sufficient strength to inflict upon targets in the enemy's homeland a degree of damage which their leaders would be unwilling to accept. In short, our air defenses assist in insuring that a massive strike will not destroy our Nation's will and ability to continue the war to a favorable end.

The possibility of attack by missiles, of course, poses a very serious defense problem for the future. However, the Army is working to develop the Nike-Zeus, which currently is the only weapon under development offering the prospect of an anti-missile defense.

Assistance to Allies

IN this era of interdependence of nations and of long-range military striking power, the security of the United States is hinged to the strength and well-being of our allies. We cannot consider our own

strategic and tactical problem without giving due consideration to the role of friendly nations. Frequently, they require assistance if they are to discharge that role. Thus it is that the Army maintains MAAGs and Missions in over 40 countries throughout the Free World.

Fundamentally, the function of personnel, such as Cpl. Blue in Korea, is to help develop the competence of allied troops in the use and maintenance of American-supplied weapons and equipment. Such competence is not merely a matter of technical operation, but includes doctrine of employment and logistical support as well. Inevitably, our advisory personnel have a wide and beneficial influence on many important aspects of our Allies' military structure. Altogether, U. S. Army personnel are assisting in the training of nearly 200 Allied divisions or division equivalents constituting a major contribution of defensive strength to Free World security.

Lending reality to field training exercises, simulated wreckage litters battlefield and smoke obscures vision as troops advance to come to grips with enemy.

Portable flame throwers form part of arsenal of today's Army troops who demonstrate their use in blasting entrenched foe.

Reserve Forces

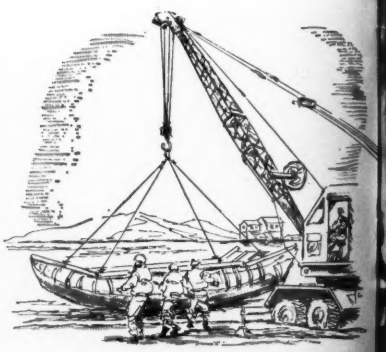
THE United States has never had, and probably never will have, active forces sufficient to meet all military requirements of the early months of war. Thus, it is essential that the Nation maintain ready reserves capable of filling the gaps in the active Army structure, providing for the inevitable losses which will occur in the early stages of conflict, and generating new units in accordance with the mobilization requirements of war. This role is filled by the Army National Guard and the Army Reserve, to which Mr. Green belongs.

The Army now has approximately 700,000 men in the organized units of the Army National Guard and the Army Reserve. These include divisions, combat support units and technical service units.

In the popular mind, the role of these forces is usually associated with general war; their limited war utility is often overlooked. The outbreak of limited war increases tension world-wide, heightens the possibility of general war, and may involve the commitment of U. S. forces to combat. Hence, it may very well generate a requirement for additional U. S. military strength in being.

During the Korean War, for example, seven divisions of the Army National Guard were brought into Federal service, initially to fill the gap created by the deployment to Korea of our strategic reserve. Eventually, two of these divisions were themselves deployed to Korea and two others helped in the build-up of NATO strength in Europe.

In reality, the reserve forces cannot be discussed as a separate category because they constitute a major increment of strength within each of the other elements. The Strategic Army Force, for example, is backed up by selected divisions and supporting units of the National Guard and the Reserve which will be trained and ready for deployment in the period immediately following M-Day. These units have initial wartime missions so important as to justify giving them special assistance in raising their level of combat readiness. Another example is in the field of continental air defense where on-site National



Guard units are manning operational air defense missile sites. In other words, so-called "reserve" forces are today a part of our "active" air defense. Clearly, the Army's components are indivisible.

The Role of the Army

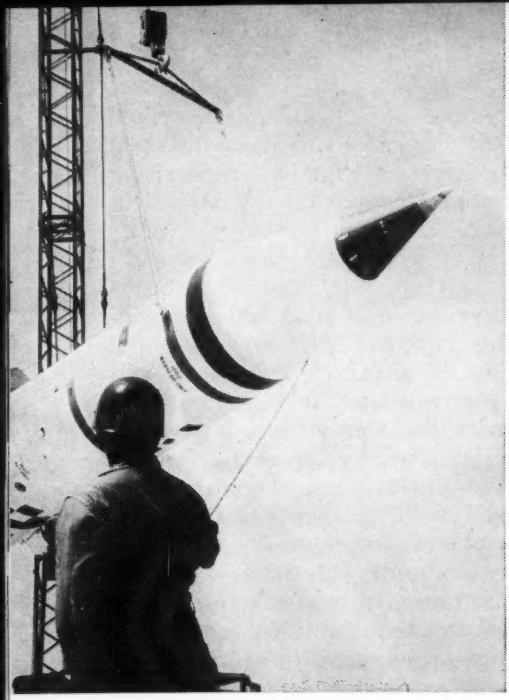
MERELY describing the tasks the Army performs and the forces which it maintains to perform them does not, in itself, establish that the tasks are essential or that the Army is necessary, now or in the future. A basic prerequisite is to identify the specific military problem which faces us.

The root of the military problem, for the United States and for the entire Free World, is the threat posed by international Communism. This threat is unfaltering in determination, massive in size, global in scope and versatile in capability. It includes the very real ability to operate throughout the entire spectrum of military activity. Its potential ranges from military support of cold war, economic penetration, propaganda, subversion, and insurrection, through open military participation in restricted conflicts, to general thermonuclear war.

It is supported by a technological capability which, as recent events have shown, is great and is increasing rapidly. Not only have the Soviets acquired a nuclear and thermonuclear capability, but they have made tremendous advances in missile development. Concurrently with these advances, they have built up their so-called "conventional" strength.

To counter this threat—or, more accurately, this family of threats—Free World military forces must present a capability which is likewise strong, flexible and wide-ranging. An essential aspect is the ability to deter the Soviets from initiating general war. This requires forces in being and properly positioned to protect critical areas and targets against land, sea and air attack plus the ability to strike a retaliatory blow of such potential

Paratroopers, like these who responded during Lebanon crisis, represent the Strategic Army Force which constitutes visible strength-in-being that can be committed anywhere.



Weapons like gigantic Redstone missile, capable of tremendous destruction, require guidance of highly trained men to be effective in case of war.

as to make all-out aggression clearly an unprofitable course of action.

But the maintenance of a deterrent to general war is not enough. It is equally essential that the Free World also develop and maintain military strength to counter lesser aggression.

Soviet strategic nuclear capability tends to protect Communist forces committed in limited war operations because it embodies a potential for destruction which might deter full retaliation on our part except in response to all-out aggression. Thus, under the "umbrella" of their nuclear capability, Communist forces might feel that they can initiate limited war with more assurance than ever before.

AGAINST this background, the role of the Army in all forms of warfare is fundamentally the same as it has always been, and more important than ever in the past. That role is to provide the forces which conduct sustained military operations on land.

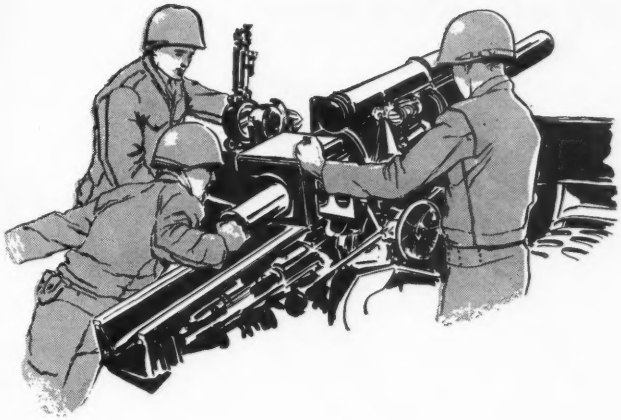
The essential requirement which must be met in order to impose our Nation's will upon an enemy is still the control of land. Land is the only element in which human beings can sustain themselves. Establishment of such control requires the combined and integrated efforts of land, sea and air forces. However, land is the ultimate military prize in war, and land forces provide the military means through which that prize is finally gained.

ARMY forces, it should be emphasized, are essential for all forms of war.

In the minds of many people, general thermonuclear war is a form of conflict in which the only significant forces are those which engage in the thermonuclear exchange. Awed by the thought of the initial destruction, these people fail to look beyond the first day or two of total nuclear war and tend to write off ensuing operations.

But the chaos and destruction which will be the immediate aftermath of the nuclear exchange will not reign forever. Civilization will rise from the wreckage and, when it does, its character will be determined by whoever controls that wreckage in the immediate aftermath of the nuclear assault. There will be a struggle for decision, and the decision will go to that side which effectively asserts control over its opponent on the ground.

As a result, total war, like all



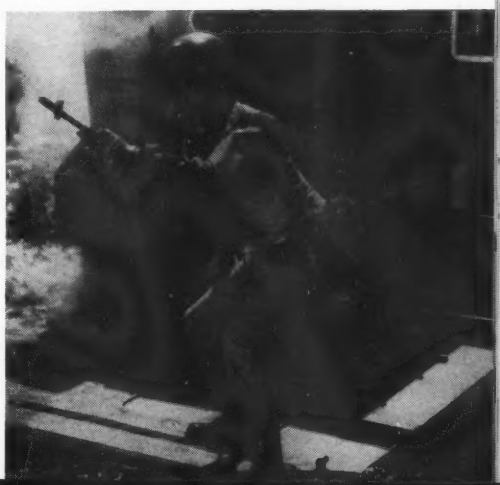
other forms of war, places an essential requirement upon the Army. This is the requirement to survive the enemy assault, to prevent his overrunning the world, and to carry out offensive operations and impose our will upon the enemy.

The need for an Army contribution in cold and limited war situations is obvious and has been demonstrated in a multiplicity of instances since the advent of nuclear weapons. Success in countering cold war offensives is dependent upon, among other things, the degree to which ability to conduct "hot" war effectively is convincing.

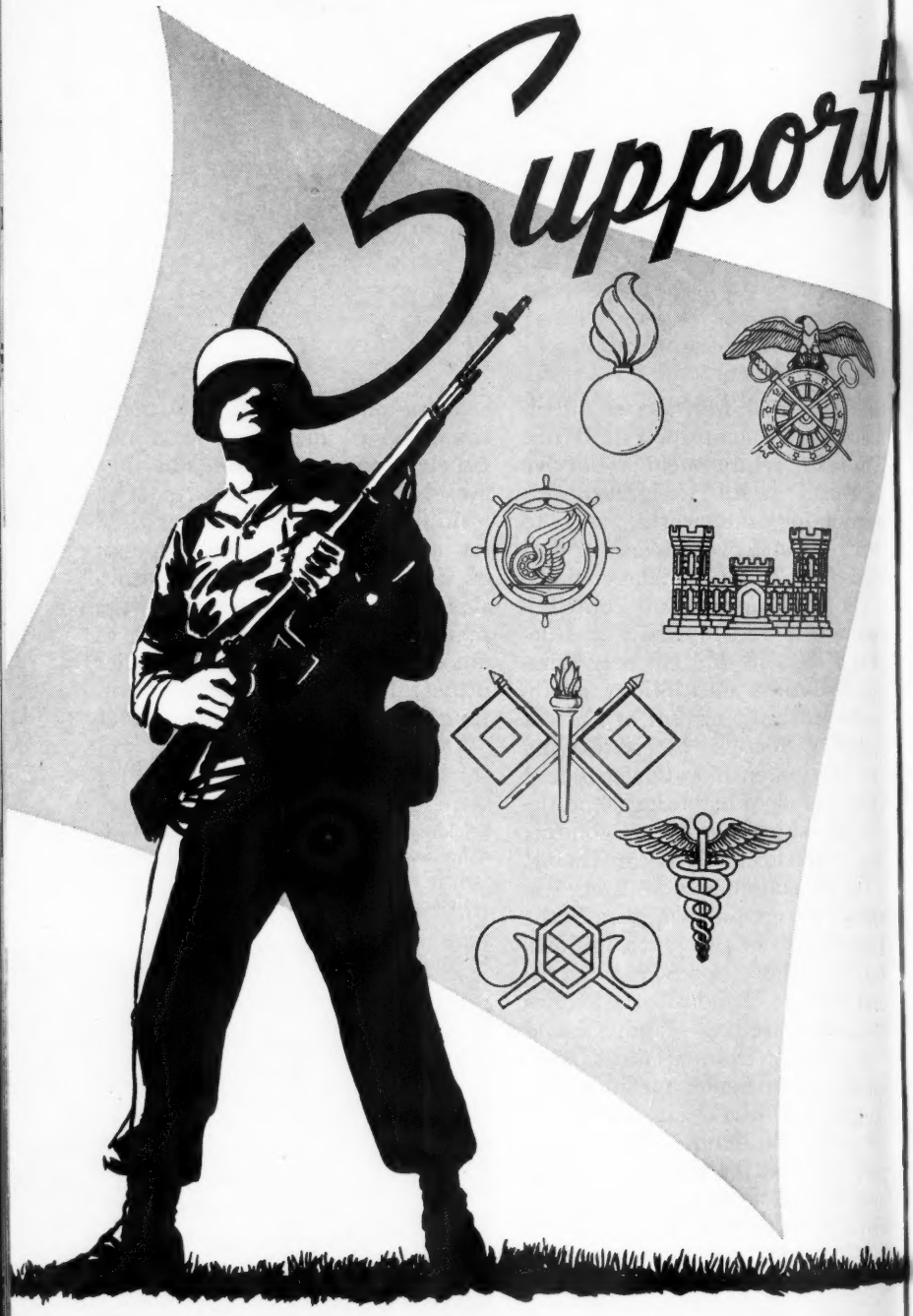
To be convincing, military capability must be appropriate to the requirements of the potential military situation. Consequently, it must include elements of all forms of military strength—land, sea and air. So far as limited war is concerned, the ultimate means which an aggressor would employ would necessarily be land forces—necessarily, because the objective of such a war would be domination of the land and its people. The final role in defeating attacking land forces is filled by armies.

In summary, the U. S. Army is composed of men, not machines. Its elements are diverse, but they are also complementary, a part of a unified whole. Each is required for the successful accomplishment of the Army's mission. This mission is, in turn, essential to the present and future well-being of our country. Thus does the soldier protect the national security—"anytime . . . anyplace . . . anywar."

Wielding new M14 rifle, protected by body armor and thermal face mask, with explosive foxhole digger on his back, this is prototype "soldier of the future."



MAN looks to logistics to deliver



IN COMBAT

TO BE truly effective in battle, the soldier—however brave, determined and skilled—must also be equipped and supported with weapons, ammunition, food, fuel, transport and the varied services which permit him to concentrate all energies on his combat task. In the following article, staff members of the Office, Deputy Chief of Staff for Logistics graphically portray the role of logistics in supporting the individual soldier during sustained combat operations.—*Editor.*

IN THIS AGE when the two mightiest nations on earth have the capability to wreak mass destruction on each other, there is a tendency to forget that even under the catastrophic conditions of nuclear warfare it is the MAN in uniform who will determine the final outcome of the conflict. Thus it is a fundamental objective of the Office, Deputy Chief of Staff for Logistics that the soldier on the battlefield be adequately equipped and supported to accomplish his close combat mission.

Attainment of this objective requires—and has resulted in—development of a versatile Army logistical support system designed to keep pace with technological developments in modern weaponry. This logistics system must not only be prepared to support the soldier in combat today; it must also look ahead and be prepared for the revolutionary conditions of tomorrow's warfare.

As presently envisioned, the ground combat soldier of the not very distant future will probably wear a plastic uniform with built-in radio, carry a nuclear weapon, use explosives to dig foxholes, have targets pointed out to him by electronic devices, travel cross-country in lightweight armored carriers or fly in aerial jeeps, eat dehydrated foods, and perhaps carry miracle drugs that will assure his survival even though badly wounded or affected by radiation.

This is a preview of the ground soldier in the next decade. He will be a soldier with considerable potential strategic and tactical mobility. He will command great firepower. However, like the soldier of old, his effectiveness will depend

upon how good a man he is, how well he has been trained and disciplined, and upon the organization, tactical and logistical concepts that give direction and meaning to his efforts.

To regain, retain, or take a piece of ground, it is necessary to place the man—the soldier—on that piece of ground. Everything in the Army's arsenal is for the purpose of putting him there and maintaining him there. From the Little John to the helmet radio and from the Mechanical Mule to the Convertiplane, the Army has developed equipment which increases tremendously the soldier's ability to perform successfully his sustained ground combat missions.

HOW is this man supported—strategically, tactically and logistically?

The Technical Services are working to make the American soldier the best armed, equipped, fed, clothed, and protected, as well as the healthiest of any in the world. These services provide the mobility and logistical support which give the Army its sustained ground combat power. This sustaining power is a key to the soldier's ability to conduct land campaigns in any part of the world.

Ordnance Corps is constantly engaged in the development and improvement of weapons which make the American soldier the best armed in the world. It is also responsible for new combat vehicles which vastly enhance the mobility of his firepower.

Quartermaster Corps continually stresses the needs of the individual man. It provides the American soldier with the best combat clothing, personal equipment and nutritious food which modern science and ingenuity can produce.

Transportation Corps is making impressive contributions to the means for moving the soldier and his equipment. It carries on forward-looking programs for the development of advanced organic air vehicles—ranging from helicopters and light planes capable of moving troops and cargo within the combat zone, to "zero ground pressure" vehicles which could replace some types of ground vehicles.

The Corps of Engineers provides combat support in the form of prepositioned demolitions, mine fields, bridging, water systems, road construction and repair and, if necessary, unit firepower in the "front lines." It also provides mapping and earth measuring information for locating worldwide targets, and constructs airfields for our growing inventory of Army aviation.

Signal Corps provides the soldier with the all-important means of communications on the battlefield, including the means of exercising command control.

Medical Corps constantly explores the entire field of medical science to enhance the soldier's health and increase his chances of survival in battle.

Chemical Corps is continually developing the means to protect the soldier and his equipment against effects of chemical, biological, and radiological agents which might be used by an enemy.

THE ARMY supports the national military strategy—"anytime, anyplace, anywar." Today's Army has a truly global mission and this

imposes a tremendous responsibility. Its units must be able to move on short notice to defend any part of the globe.

The Strategic Army Corps (STRAC) is the "fire brigade" of the Army—a ground combat force poised and ready to fight, day and night, around the clock. STRAC is a balanced force with supporting units which give it staying power, and it is ready to employ an arsenal of weapons ranging from the bayonet to the atomic warhead in ground combat. This is a key to the ability to conduct extended land campaigns in any part of the world.

Although STRAC is all these things, there is one prime prerequisite which it cannot provide for itself. Its strategic mobility depends to a major extent on the airlift available.

Strategic mobility, in this sense, encompasses the ability to move units rapidly over great distances, together with their equipment, supplies and service support.

STRAC requires a combination of airlift and sealift to attain this mobility. The Army must depend upon the Air Force for sufficient airlift to carry its STRAC forces to combat aggression, wherever necessary; and also on the Navy to provide sufficient shipping to support the oversea deployment of forces in sustained ground operations.

The Army has increased its own sea-lift efficiency through development of roll-on roll-off ships that can load and discharge mobile equipment in hours instead of days, and a new rough terrain forklift truck that can swiftly unload huge tonnages. It also has developed improved over-the-beach concepts and equipment to provide greater strategic mobility.

Tactical mobility is the capability of movement in the presence of enemy forces or in the execution of any tactical mission. Such mobility requires thoroughly trained units equipped with powerful weapons and lightweight equipment. These forces must exist on minimum logistical support. Tacti-

"The new M-60 main battle tank is a long stride forward in search for reduced weight, lower silhouette, improved operating range, lower fuel consumption, increased firepower."

"While the helicopter has given revolutionary assist to mobility, efforts are being made to provide vehicles for specific purposes."

cal mobility also requires the attainment of unrestricted cross-country movement through the proper combination of movement by foot, by ground vehicles or aircraft. Finally, it requires proper communications facilities.

Firepower

AS LONG as men have fought each other on the ground, fire and movement have been the combination which achieved victory. This same combination is indispensable today. The soldier, to perform his essential mission of ground combat, must have the means to shoot, move, communicate and exist on the atomic or conventional battlefield of the future.

Weapons ranging from small arms to tactical missiles have been developed to provide the soldier with the ability to produce any desired degree of force to meet varying conditions. Not all of these are in the hands of troops at this time however, and some are in limited production due to lack of sufficient funds.

The M-14 rifle and M-60 machine gun have been accepted—but it will take a little time to fully equip all ground soldiers with these superior weapons. Several types of recoilless rifles are being standardized as the M-40 system, a big step forward in longer range, lighter weight, greater lethality and simplicity. Limited procurement of this weapon has been initiated.

Because of their unique capabilities, firepower and shock action, mounted weapons protected by armor continue to enhance the soldier's effectiveness on the battlefield. The new M-60 main battle tank is a long stride forward in the search for reduced weight and lower silhouette, improved operating range, lower fuel consumption, and increased firepower. Ideally, the Army seeks a single family of armored vehicles which would combine the capabilities of the existing vehicles and be capable of ground

combat under all conditions.

Artillery supports the soldier with exactly the degree of heavy firepower needed. The capability of convenional artillery has been markedly increased through improvements in ammunition and the development of the atomic shell. Artillery weapons systems are being made more mobile and air transportable, and self-propelled weapons with a nuclear capability are being developed.

Numerous projects for more improved ammunition, target acquisition, and battlefield surveillance equipment are under way. While progress has been made, the problem of production in quantities sufficient to supply troop units creates a lag between plans and availability of the items to troop units.

Ground-to-ground missiles—whether equipped with conventional or nuclear warheads—extend the range of conventional artillery and will be used in much the same way as conventional cannon to support the ground combat soldier.

In attempting to provide greater mobility, "air transportability has been stressed as a leading characteristic of most combat items under development."

The Army has made a creditable start in providing itself with an atomic missile delivery capability. Lacrosse will provide the pinpoint accuracy necessary for close-in small-yield delivery for friendly troops. Little John provides a highly mobile weapon for airborne or airtransportable operations. The Sergeant, designed to replace the Corporal, is solid-fueled and thus easier to handle and maintain. The Pershing, when available, will replace the Redstone and provide the Army field commander with a

One of the newest aircraft to be accepted by the Army is the Caribou, a fixed-wing aircraft capable of carrying 31 passengers, 22 litters, or three tons of cargo.

missile of significant range capability and a relative lightweight weapon that can be easily supported logistically.

Although some of the Army's new developments are not in quantity production today, it must not be concluded that the combat readiness of the soldier is dependent upon full issue of new weapons and material to every unit. While full production of this equipment will materially enhance the Army's capabilities, our deployed forces and those in STRAC are combat-ready today.

The Army has not abandoned its conventional weapons for the so-called glamor weapons. On the contrary, it recognizes that the dual-capable ground soldier is essential to meet the requirements of ground combat in the foreseeable future.

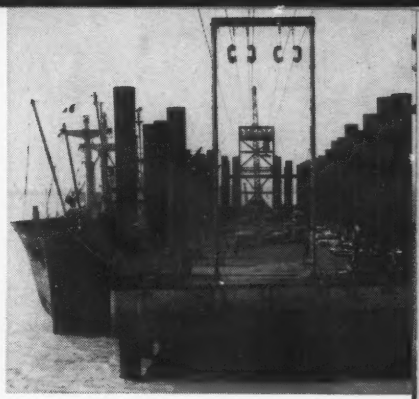
Mobility

CURRENT efforts to increase the soldier's surface mobility are focused on compact, lightweight, air-transportable vehicles capable of travelling over any land surface or small bodies of water. Besides travelling long distances on low-cost fuel, the vehicles would protect the soldier against small arms fire, shell fragments and nuclear effects.

Considerable strides have been made in producing ground vehicles that are lighter, more economical, easier to maintain and refuel, than existing items. Some examples include the Mechanical Mule, already in production, the M-113 armored personnel carrier, which is air-droppable, and the new intermediate duty truck, XM410. The latter is part of a development plan calling for an entirely new "family" of trucks that will meet requirements for greater mobility, and greater payload capabilities with fuel economy.

AIR transportability has been stressed as a leading characteristic of most combat items under development. Both speed and freedom from terrain restrictions have great value in tactical and logistical operations. While the helicopter has given a revolutionary assist to mobility, continued efforts are being made to provide air vehicles for specific purposes. These vehicles would be able to operate in all kinds of weather, travel over unimproved terrain, carry up to ten

Giant 50,000-gallon collapsible fuel storage tank is made of nylon cloth coated with synthetic rubber, weighs 2,700 pounds empty, is 64 feet long, 24 feet wide, and about six feet high when filled to capacity.



Stepping up capabilities in strategic mobility are roll-on roll-off vessels, left, and new aerial tramway, right, which allows swifter means of discharging cargo.

tons of payload, require less fuel, possess increased range, and be easier to maintain.

Stress is being placed on short-take-off-and-landing (STOL) or vertical-take-off-and-landing (VTOL) capabilities for fixed-wing aircraft. Advantages of the VTOL aircraft are obvious—ability to pick up and deliver men or cargo without regard to landing strips, to hover, and to take advantage of terrain cover.

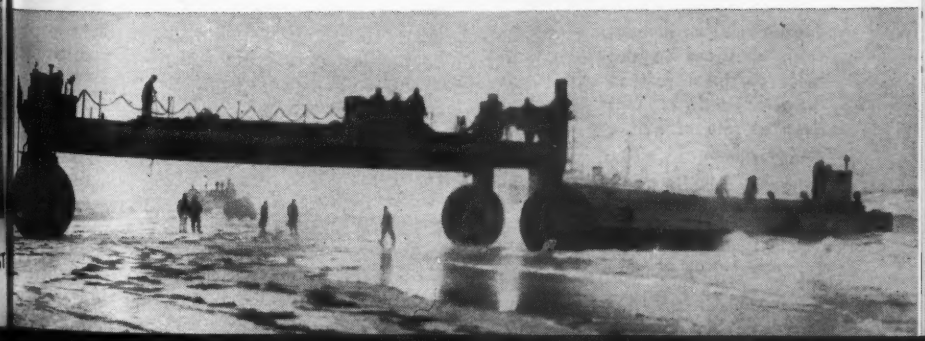
Some of the new Army aircraft include the Iroquois—a turbine-powered utility helicopter; Mojave—a medium transport helicopter; Mohawk — a fixed-wing aircraft capable of carrying surveillance equipment; and the Caribou—a fixed-wing aircraft capable of carrying 31 passengers, 22 litters or three tons of cargo. (See "Mobility Now," April 1960 DIGEST.)

With sufficient funding, most of the aircraft under development could be put into production with little delay.

Communications

WITHOUT communications,

Amphibious BARC, right, and retriever for beached landing craft, below, were designed to facilitate over-the-beach operations.



the new weapons, trucks, tanks, and aircraft would be of little use to the ground soldier on the modern battlefield. Lacking means of control, dispersed units would be unable to act in concert, converge, lay down firepower, penetrate enemy territory, or disperse.

Communications provide the nerve system that permits the various parts of the Army "body" to function as an efficient entity. The ground soldier needs communications-electronics equipment that is compact, lightweight, rugged, easily maintained and installed under combat conditions.

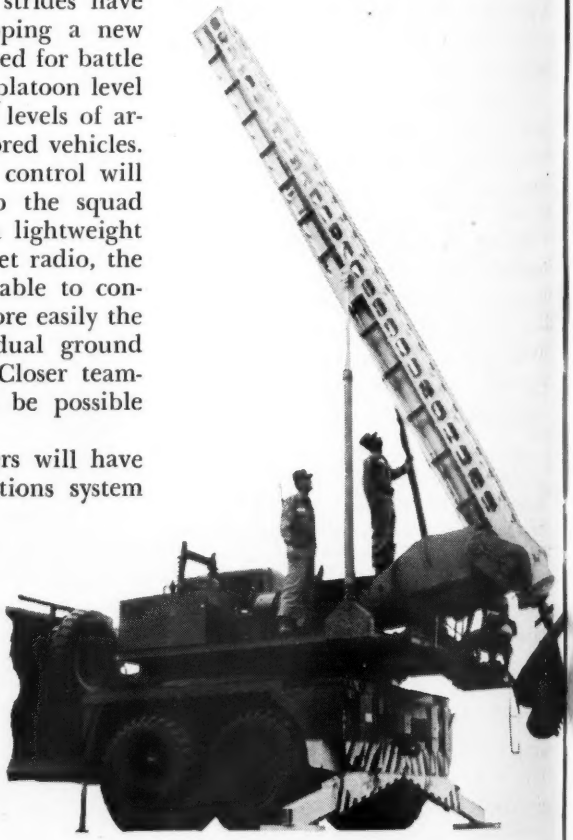
Impressive forward strides have been made in developing a new family of radios required for battle groups, company and platoon level in the infantry, at all levels of artillery and in all armored vehicles.

Increased means of control will be extended down to the squad leader. Using either a lightweight helmet type or a pocket radio, the squad leader will be able to control and coordinate more easily the actions of the individual ground soldiers in his unit. Closer teamwork in combat will be possible within the squad.

Forward area soldiers will have a flexible communications system with more channels, fewer types of equipment, and greater operating ranges. The decreased number and lighter weight of these sets will aid mobility.

Battlefield intelligence support includes reliable, accurate and continuous intelligence of the enemy, weather, terrain, and the friendly troop situation. To meet these requirements under conditions of increased mobility, dispersion, and firepower, new and improved equipment is essential.

In two areas — combat surveillance and target acquisition — equipment has been developed to



Experimental earth auger is designed to dig holes up to 6 feet in diameter and 22 feet deep at rate of half a foot a minute.

increase the Army's current capabilities, using photography, radar, infra-red, television, acoustics and electronic intercepts, and automatic data processing.

Logistical Goals

FROM all of this it becomes evident that progress is being made toward modernization of the ground soldier's capabilities in firepower, mobility and communications. The Army's aim is to provide its forces with the best weapons, vehicles, and electronic equipment that can be developed. However, the best weapon or device ever conceived will not strengthen the fighting ability of our forces until it passes from the blueprint, to the production line, and finally into the hands of ground combat soldiers.

These concepts and goals reflect Army endeavors to enhance the soldier's ability to fight and win future land battles. But concepts alone are incapable of turning a wheel or projecting a nuclear payload to its target. Progress toward these goals, while evolutionary, is directly dependent on adequate budgetary support and on the full support of the other services.

To say that logistics is an essential in achieving a modern Army is to understate the problem. Vision can tell us what is necessary and science can provide the technical solution—but logistics must produce and deliver the goods so that the soldier can live, move and fight on the battlefield.

Pattern of the Future

MAINTAINING this "flow" of supplies presents a major problem. The "supply flow" begins on the drafting table and ends when the needed items are placed in the hands of a unit or the individual soldier. Supply lines originate in the United States and end wherever American troops face the enemy in an oversea theater.

Electronic sentry is compact, all-weather radar "eye" which can spot enemy soldier half a mile away in dark or large groups at greater distance.

The Army logistical organization can no longer afford the luxury of the vast supply concentrations of World War II theaters of operations. No longer can it permit vast concentrations of shipping in any location, nor can reliance be placed upon the use of large fixed ports of entry. To concentrate ships, supplies and equipment in a single location is to offer a highly remunerative target. Such targets must not be allowed to form.

In future theaters of operations, packets of ships will unload supplies at many locations along the lines of communication. Other ships may unload over sheltered beaches using floating piers, landing craft, lighters, or any other available means. Roll-on roll-off methods of handling cargo will reduce the time that ships must remain in the discharge area.

To keep tanks mobile, new engine may be installed in the field, as this crew is doing during maneuver of Army troops in Germany.

Tactical concepts of battlefield operations in widely dispersed formations and frequent fluid situations affect the flow of supplies up to and within the division. Disperse the battle groups of a division over hundreds of square miles of land—break up the battlefield to the point where there are no actually well-defined lines—further scatter units of the battle groups over still more land—have these soldiers so highly mobile that they strike one place today and are many miles away on the same day—and it is apparent that the supply flow necessary to support the soldier in sustained ground combat under fluid conditions will be highly complicated.

An indispensable ingredient in the soldier's ability to accomplish his mission is a logistics system capable of rapid and effective support in a wide variety of ground operations. The system must keep pace with fast-moving combat elements without being crushed by the weight of its own support requirements.

As one approaches the battle area, the movement of supplies be-

Four-wheel-drive moving platform can take off across rugged terrain in forward or reverse to deliver supplies.

New intermediate duty experimental truck XM-410 is part of development plan calling for new "family" of Army trucks.

comes more and more difficult. At the same time, the need for movement becomes greater since the power of atomics has enhanced the ability of ground combat forces to move. However, it is not necessary to throw away all the logistics lessons learned in prior wars merely because larger explosions can be produced at greater distances.

The Division Quartermaster would attend to the flow of rations and petroleum products needed to feed the combat soldier and fuel his vehicle.

The Division Ordnance Officer would provide the control necessary to supply the ammunition needed to support the soldier, while organic unit transportation would move it forward.

Technical Service units of the division would provide field maintenance support for vehicles, artillery, small arms, radios, telephones, radar, and all other tools of the soldier's stock in trade.

This is how the versatile, combat-ready ground soldier is supported in his mission of sustained land combat. At the point of contact with the enemy, the rifle, machine gun, and mortar remain the basic tools of close combat. Tanks and armored personnel carriers afford protected mobility as the soldier moves through fireswept or nuclear contaminated battlefields. Flexible and responsive communications constitute his nerve system of control and command.

THE search for maximum combat effectiveness on the battlefield is a continuing process. While final solutions as to ways and means have not yet been reached, there are certain clear guidelines which characterize all of the Army's forward-looking theories dealing with the conduct of land combat.

These guidelines represent no revolutionary departure from the still valid principles of ground warfare. Instead, they provide a reorientation of emphasis which is designed, on the one hand, to maximize the effective use of atomic weapons in land combat and, on the other, to exploit the United States ground soldier's dual capability in successfully meeting the ever-present and significant enemy threat of conventional warfare.

Developed as a rough terrain forklift, new crane truck is being tested to simplify handling of missiles at launching sites.

Man + R & D = the working combination that unlocks the

AMONG the theories expressed today concerning the nature of modern war is one which holds that the advent of nuclear weapons and new means of delivery has invalidated the historic concept of man as the ultimate weapon.

This view limits war to absolute terms — missiles, minutes, massive destruction.

It is predicated on the assumption that the current character of war is so total and final that space-spanning thermonuclear weapons have rendered ground forces obsolete and are making individual soldiers obsolescent.

In the light of objective analysis, this thinking reveals a curious quality—"tunnel-vision."

Certainly it is true that this age of threatened devastation calls for a capability which assures the Free World power of nuclear retaliation against potential aggressors.

Equally true is the fact that since 1950 American ground forces have been involved in a series of more conventional war threats and actions, ranging from bloody conflict in Korea to tense landings in Lebanon. And throughout the world, during this past decade, allied armies time and again have experienced the cold fact that conventional war is an ever-ready instrument of international Communist policy.

KEY TO NATIONAL SECURITY

LT. GEN. ARTHUR G. TRUDEAU
Chief of Research and Development, Department of the Army

Thus the school of thought which leaps to the theory that man no longer is needed in this modern era is one which discounts all history, dismisses the present, and denies the future.

IT IS interesting to note that the American, the other Free World armies—*and the Soviets*—agree on this point! In a recent Russian military journal appears the following pertinent testimony:

"It is true that a contemporary war is a war of the physical, chemical and biological sciences, of the technical sciences, of science in general, but it is also true that a third World War, like all past wars but to a still greater degree, will be first and foremost a war of man."

This is but one among Russian statements indicating that the results of Soviet nuclear-war combat environmental studies, paralleling our own, prove that individual soldiers and units can and will survive modern attack to continue as effective, fighting elements.

Post-World War II study and evidence continue to underline the fundamental principle that today, as throughout past centuries, the most important factor in any combat operation, whatever the conflict type or dimension, is MAN himself—that no concept or contrivance ever will substitute for the

Divinely-granted human powers of imagination, logic and performance in battle, ground or space.

Man is, then, and will remain, the most essential element in war. Men, not machines, win or lose the battles for liberty and freedom. It is within this context that the Army today pursues its dynamic approach to "national security through research and development."

THE scope of the Army's research and development effort literally is limitless, for its objective is to best fit and equip a man to do a job in an environment more scientifically and technologically hostile than ever before in history.

The mission of our R&D effort is to design and create for soldiers the weapon systems and materiel most effective for winning control of contested ground and for the air and missile defense of our populace and fighting forces.

The program to accomplish this mission covers two main areas—first, basic research; and second, applied research and development. Both lead to the production of "hardware."

Basic Research

TODAY the extent of Army research effort is measured in terms of some 2600 projects spread across 16 major scientific disciplines and 74 subfields. Work is underway at 52 U. S. Army locations, 21 other government agencies and over 550 United States colleges, universities, research institutions and other contract organizations.

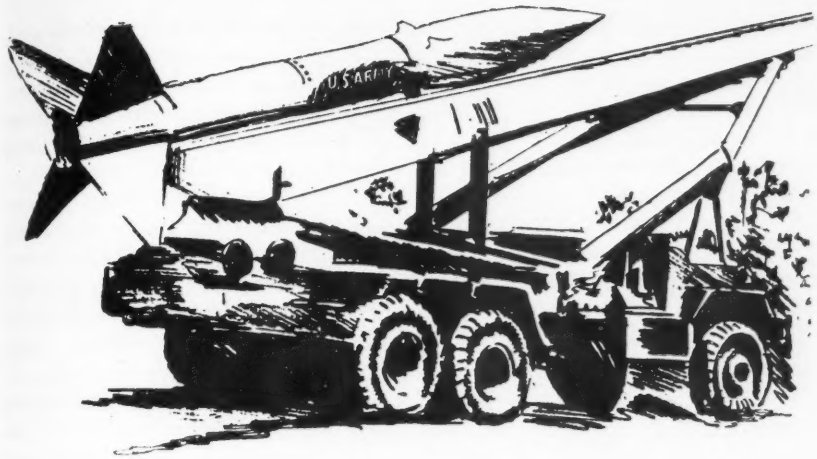
The present price tag on basic research is approximately $90 million annually, and the exploration covers an extremely wide spectrum.

Basic research is crucial! It is the chief determinant of progress in the weapon art for this decade, and beyond. The Army clearly comprehends the need constantly to expand the horizons of basic research, to out-maneuver and to outdistance the Communists in this critical area.

It is a truism that, in every age, great advances always have reflected the genius, talent and leadership of particular individuals. Therefore great value is placed by the Army on the service of the lone, creative men of science and of the small research teams engaged in these projects. From their dedicated and industrious labors inevitably come the "basic breakthroughs" so vital to defense readiness in troubled times.

One illustration of this is the work of Professors Kusch and Lamb of Columbia University that won the Nobel Prize for Physics in 1956. Their findings concerning the hyperfine structure of hydrogen led to development of the gaseous MASER (microwave amplification by stimulation of emitted radiation), later followed by the solid-state MASER conceived by Professor Bloembergen of Harvard University. The highly stable frequencies and low noise characteristics of the MASER device represents a basic breakthrough in the field of communications. This work currently influences new, advanced approaches to Army problems in combat communications and radar systemization.

Metallurgy is another dramatic field. Here the creation of new metals with amazing characteristics is evolving from explorations of extremes in temperature and pres-



sure, promising creation of alloys stronger, more heat-resistant and lighter than any known today. Such an advance materially benefits Army progress in such fields as missile and vehicle development and electronics.

Electronics itself has witnessed a research-sparked quantum surge staggering to the imagination. Here, basic research already has led to a technique of micro-miniaturization whereby today the Army is packing 700,000 electronic parts into a space which formerly held but 7,000!

In the fascinating and significant realm of the environmental sciences, problems of the "sub-zero," "Sahara" and jungle soldier are receiving close attention. Deep in the strategic Arctic region, on the Greenland Ice Cap, researchers are grappling with the physical properties of snow, ice and frozen ground. At the opposite end of the environmental spectrum, they are exploring the difficulties faced by men subject to intense stresses of heat, humidity, sandy waste and diseases of desert and tropics.

IN medicine, the Army's research realm is equally extensive, encompassing broad-scale approaches to problem areas such as the treatment of radiation casualties and other types of nuclear-battlefield injuries; employment of antibiotics and nicotinic acid derivatives; refinements in the fields of pharmacology, physiology, psychology and others.

From pioneering research have come such blessings as the new "nerve-knit" technique whereby severed nerve-ends, the major cause of limb loss, can be re-joined to save arms, legs and other injured members, and approaches to a "bone glue" which will make it possible to cement together the ends of fractured members or replace shattered segments.

Yet another facet of Army basic research focuses on food—its preservation, preparation, palatability —and the general improvement of battle rations.

A final, vital illustration of the significance of our basic research program is the effort devoted to human factors engineering — the

establishment of the very parameters of the military-human equation. Here we are concerned with the selection, classification, assignment, training and utilization of men and manpower; the resolution of man-machine compatibility questions; the identification, improvement and promotion of officers and men best fitted to fight, to lead, to win. This human factors research strikes directly to the heart of battlefield efficiency!

All told, the Army's basic research program moves at a high level of endeavor. It constantly pumps into the applied part of the Army's over-all R&D program that priceless product of advanced scientific and technical knowledge, fact and technique which represents the key to national security through research and development.

Applied Research Activities

IT IS in the applied R&D area that the leads and proceeds of basic breakthroughs and refinements are incorporated into current and future requirements. This area emphasizes needs in the fields of mobility, communications and firepower.

Today Army funding for applied research and development requires a billion dollars annually. The effort is immense—the challenge demands it, "that this nation shall not perish."

Some current items and systems in this tremendous soldier-support area include:

Mobility. To provide the ground mobility required for the battlefield of the future, we are looking to the development of GOER type of equipment used in commercial earth moving and heavy construction work, where large wheels and tires give true, off-road mobility. The GOER is also a potential carrier and launching vehicle for many of the missiles now coming into the Army's arsenal.

New tanks and armored personnel carriers soon are to be operational to back up the striking power of powerful new weapon systems. These ground vehicles will be great improvements over today's tanks and armored personnel carriers, in size, weight, engine performance and fuel consumption. Where possible, they will have both swim and air-transportable capabilities.

In the air, we are looking for the type of vehicle that will provide the take-off and landing characteristics of the helicopter and the fuel economy and speed of the fixed-wing aircraft in forward flight. Our flying test beds look like disks, platforms, or "flying saucers" propelled by unusual power plants. These are the vehicles that may give the answer to flying low, slow and *quietly* just above the battlefield.

Communications-electronics developments are enabling the Army to increase its command and control capabilities to the degree required by mobility and dispersion. Included in this area, also, are the surveillance drones that will penetrate enemy lines to send back information of the enemy. Here a wide variety of sensors—radar, automatic cameras, infrared, acoustic, and seismic devices—are being studied and adapted for drone use.

In this same area, we are working on automatic data processing systems to sort and evaluate enemy information so that the comman-

der will have the intelligence he needs for a rapid decision. Intelligence of the enemy is most important in assuring timely delivery of effective missile and artillery fire against suitable enemy targets.

Firepower is always a critical part of the Army R&D program. Improved rifles and other small arms soon to be operational outperform present weapons, but we are striving for still better ones tomorrow. Many types of guided missiles and rockets are under development to supplement or replace those now in the hands of troops.

Among these are Sergeant and Pershing, both long-range, surface-to-surface missiles being developed to fire at ground targets. In the shorter ranges of conventional artillery, we have improved reliability and accuracy of delivery by developing Lacrosse. This is a highly accurate guided missile which will provide all-weather, close tactical support for the front-line soldier. We have Honest John and are developing Little John, two extremely versatile free rockets for field use.

At the Aberdeen Proving Ground last October, a Little John rocket system and its crew were flown by helicopter to a launching area. In less than twelve minutes after landing, the rocket was launched—convincing proof that the helicopter is another natural carrier for a series of missiles in the Army's arsenal. This imaginative marriage of missiles and 'copters will permit battlefield movement to launch sites at speeds of up to 150 miles an hour.

The Army has an important mission in the air defense of its troops. Currently under development are a shoulder-fired missile, called Redeye, for combat soldier use against attacking aircraft, and a larger Hawk missile system to be employed by field Army units against low-flying aerial targets.

Probably the Army's most important contribution in the future for missile defense of the United States will be Nike-Zeus, the only weapon system in sight that is designed to attack and destroy incoming ballistic missiles. Both the

Designed to protect ground troops against low-flying aircraft, Redeye is new portable, shoulder-fired missile under development.

booster and sustainer rocket motor have been successfully fired, and we are now approaching the testing stage of the complete system. In the near future we hope to fire it against our own IRBMs and ICBMs to establish its effectiveness for missile defense of our country. There is an urgent requirement for such a weapon while our Nation is faced with the ballistic missile threat of the Communists. We are confident that Nike-Zeus can do this job in the 1960's!

Chemical Weapons. In this field we know that the Soviets are putting a high priority on development of lethal and non-lethal weapons. Russian leaders have boasted that they are fully prepared to use new chemical weapons of great significance. If the Communists ever use chemicals, with which they are well equipped, our forces must be prepared to meet such an attack.

Among chemical counter weapons now under Army R&D scrutiny are incapacitating agents that allow personnel to recover completely with no permanent after-effects.

These chemicals are basically of two types. One type is psychochemical which disturbs the normal behavior pattern of the individual, causing either apathy, fear, or mental disorientation. The other type is physically incapacitating, causing, for example, temporary blind-

Although rifles and other small arms like the M60 machine gun have been developed to outperform existing weapons, Army strives for still better ones.

"For movement of large tonnages, a large wheel, positive wagon-steer, all-wheel-drive vehicle known as GOER is in the testing stage . . . for use in highly mobile Army forces."

ness or paralysis. These chemical agents could be used against an enemy without causing fatalities or large-scale destruction of buildings, bridges, factories and entire industrial complexes.

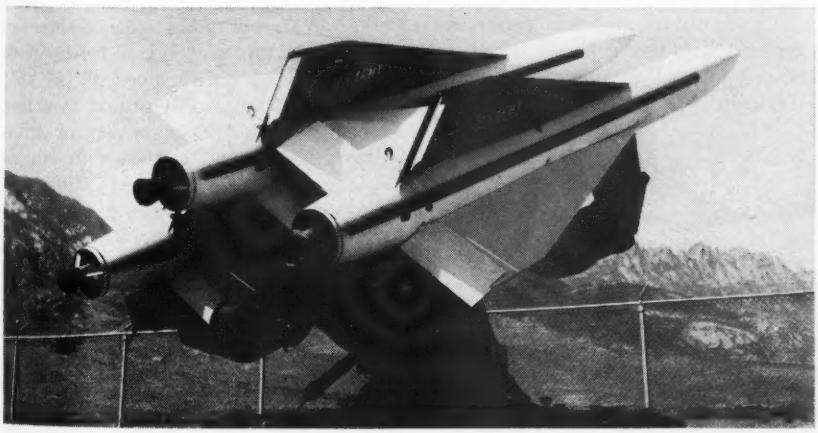
Recent Developments

FOLLOWING are some representative examples of recent products of applied research.

Artillery Gun Carriages. When the 175mm gun is in firing position in this new self-propelled carriage, the wheels as well as the track are locked for stability. This reduces the amount of vehicle displacement when the gun is fired and consequently improves accuracy and rate of firing. The new carriage weighs only half as much as its predecessor.

Armored Personnel Carriers. The new armored personnel carrier can be both air-transported and air-dropped. It is highly mobile, swims inland waters,

Termed "the bullet with a brain," Hawk provides low-level defense against enemy missiles, recently scored a "kill" on an Honest John in flight.

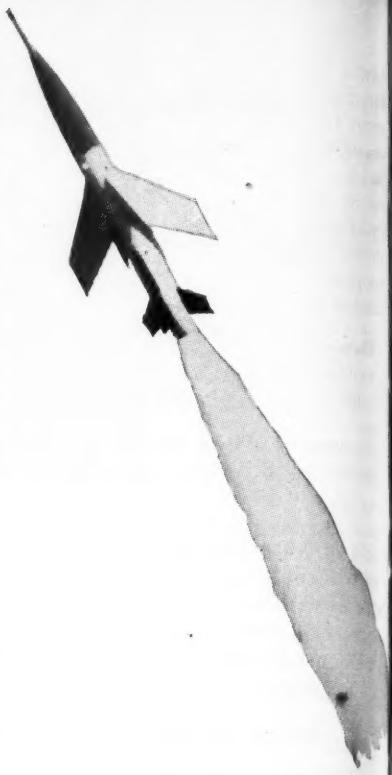


and transports a driver and 12 men. Aluminum armor protects occupants from atomic blast and heat, as well as from small arms and shell fragments. A weight saving of 50 percent has been achieved.

GOER Vehicle. For movement of large tonnages, a large-wheel, positive wagon-steer, all-wheel-drive vehicle known as a GOER is in the testing stage. This concept, incorporating a new approach to logistical carriers for use in highly mobile Army forces, is an outgrowth of developments in heavy, commercial, earth-moving equipment. It is rugged, reliable and exceeds any other wheeled vehicle in true off-road mobility. It overcomes large obstacles that stop conventional trucks, and maneuvers effectively through mud.

DOAK Aircraft is designed to take off and land like a helicopter but operates in the air like a conventional airplane. Using rotatable ducted fans as its source of propulsion, it takes off with the fans at about a 90° position. The propeller ducts are then rotated to full-forward position, permitting normal flight characteristics. To land, engines are returned to the vertical.

Piasecki Flying Platform. This test bed, commonly called the Piasecki "flying jeep," is one of two models under development. It employs ducted fans for propulsion and has conventional type helicopter controls. Feasibility of this type of air movement has been established.



Lacrosse is close-support guided missile of extreme accuracy that is air transportable, can be fired from launcher on standard truck.

Caribou—recently officially accepted by the Army—is a twin-engine passenger or cargo plane with a three and one-half ton payload, a range of 600 miles and cruising speed of 160 knots. The Caribou is envisioned as a troop transport and as a carrier of critical supplies. It can be flown in and out of semi-prepared, short landing strips. A wide-opening door permits rapid loading and unloading of two jeeps or 31 troops.

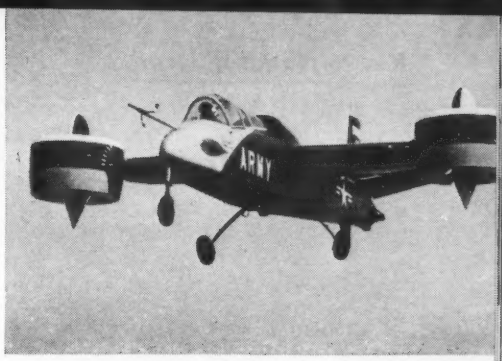
Surveillance Drone. In the surveillance field, an ordinary target drone has been fitted with cameras to provide a surveillance capability. Jet-boosted into flight and radio controlled, it at-

tains a speed of about 180 miles an hour and is capable of photographing enemy terrain and positions both day and night. It is recoverable by its own parachute. Obviously, it is only an interim device; however, drone systems that will fly at much faster speeds are under development, with capability for radar mapping, photography and infrared detection.

Chemical Weapons. Non-lethal gases are envisioned as a possible alternative to the massive exchange of thermonuclear weapons or the use of toxic agents. In laboratory tests a cat radically changes its normal behavior pattern when subjected to the harmless gas—and actually displays fear of a mouse. Humans, after receiving a dose of this gas, fail to follow orders or instructions and will wander aimlessly.

Lacrosse. One of the latest weapons, Lacrosse is a close-support guided missile of extreme accuracy. Highly mobile, it can be fired from a launcher mounted on a standard truck, and can be carried by a helicopter. It will be used by both the Army and Marine Corps.

Sergeant, like the Corporal that it will supersede, can carry an atomic warhead to about a 75-mile range. It is smaller, more efficient—a solid-propellant missile that provides much easier, faster, and simpler handling in the field. Sergeant is under advanced testing now and soon should go into production. It will carry a variety of warheads.

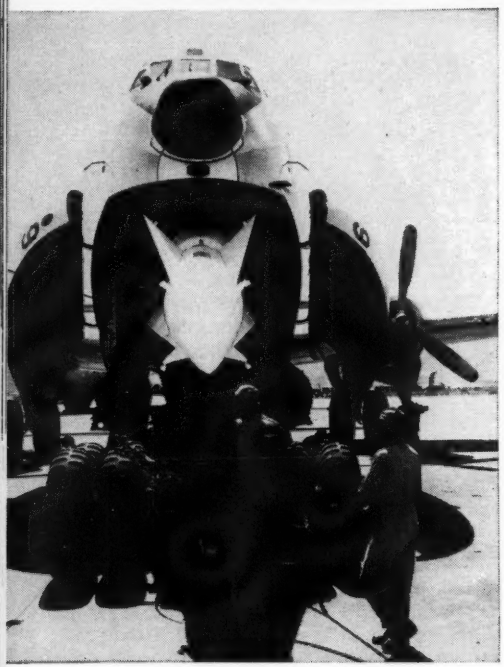


A research aircraft, the convertiplane is designed to take off and land like a helicopter but flies like a conventional aircraft.

Hawk air defense weapon is "the bullet with a brain." So-called for its performance as "Homing All the Way Killer," it provides a low-level air defense capability, and is the counterpart of the Nike-Hercules. It carries a high explosive warhead. Hawk recently intercepted targets below 100 feet and up to 50,000 feet in altitude. Hawk battalions now in training are expected to be operational in the near future.

THESE specific illustrations represent some of the interesting hard-

With feasibility of this type of air movement established, Piasecki flying platform under development uses ducted fans.



Now being placed in air defense systems of major American cities, the Nike-Hercules is second-generation missile capable of being carried by plane.

ware now in development for the Army of tomorrow. They are just a sample of the extensive range of Army R&D projects which are necessary for effective, future land combat.

Basic to today's modern Army, and essential to the evolution of tomorrow's, is the role of research and development. Necessarily the Army emphasizes this important program—the need that it be continued, improved, and adequately funded for the long pull ahead.

Challenge of Our Times

THE philosophy which guides the entire R&D effort is expressed in the old maxim: "Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after changes occur."

In these troubled times every soldier and patriot today should remember the words of Manuilsky, leader in the Lenin School of Political Warfare, in 1931:

"Our time will come in twenty to thirty years. The bourgeoisie will have to be put to sleep, so we will begin by launching the most spectacular peace movement on record. There will be electrifying overtones and unheard-of concessions. The capitalist countries, stupid and decadent, will rejoice to cooperate in their own destruction. They will leap at another chance to be friends. As soon as their guard is down, we shall smash them with our clenched fist."

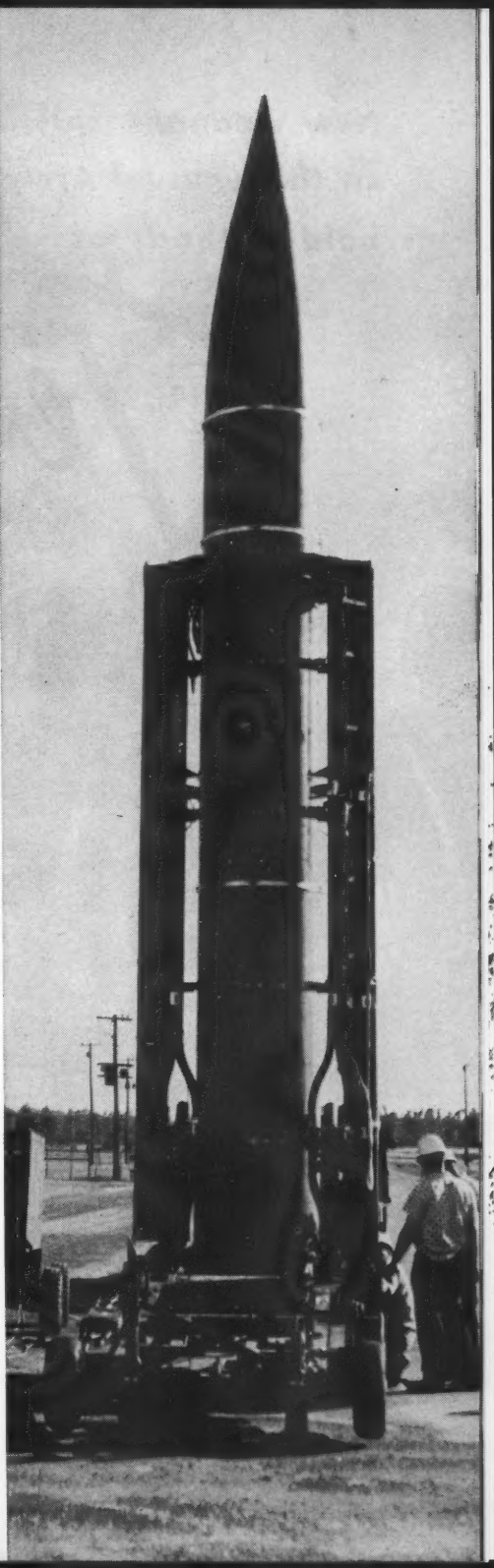
Proof that helicopter is "another natural carrier for a series of missiles" was shown when Little John rocket system and crew were flown to launching area and rocket was fired in less than 12 minutes.

An example of allied cooperation in research and development is the SS-11, developed by the French and now undergoing exhaustive tests by U. S. Army.

Today, to peace-hungry multitudes throughout the world, the siren song of Soviet co-existence rings with promise. Fortunately, it has yet to drown out the Free World doctrine — "deeds, not words." Nor will it, so long as we and peoples elsewhere continue to dedicate ourselves to the principle that peace and security are indivisible from freedom and justice.

In this life there are few certainties. One of them is that eternal vigilance is the price of liberty; and surely a second is that preparedness is the key to survival.

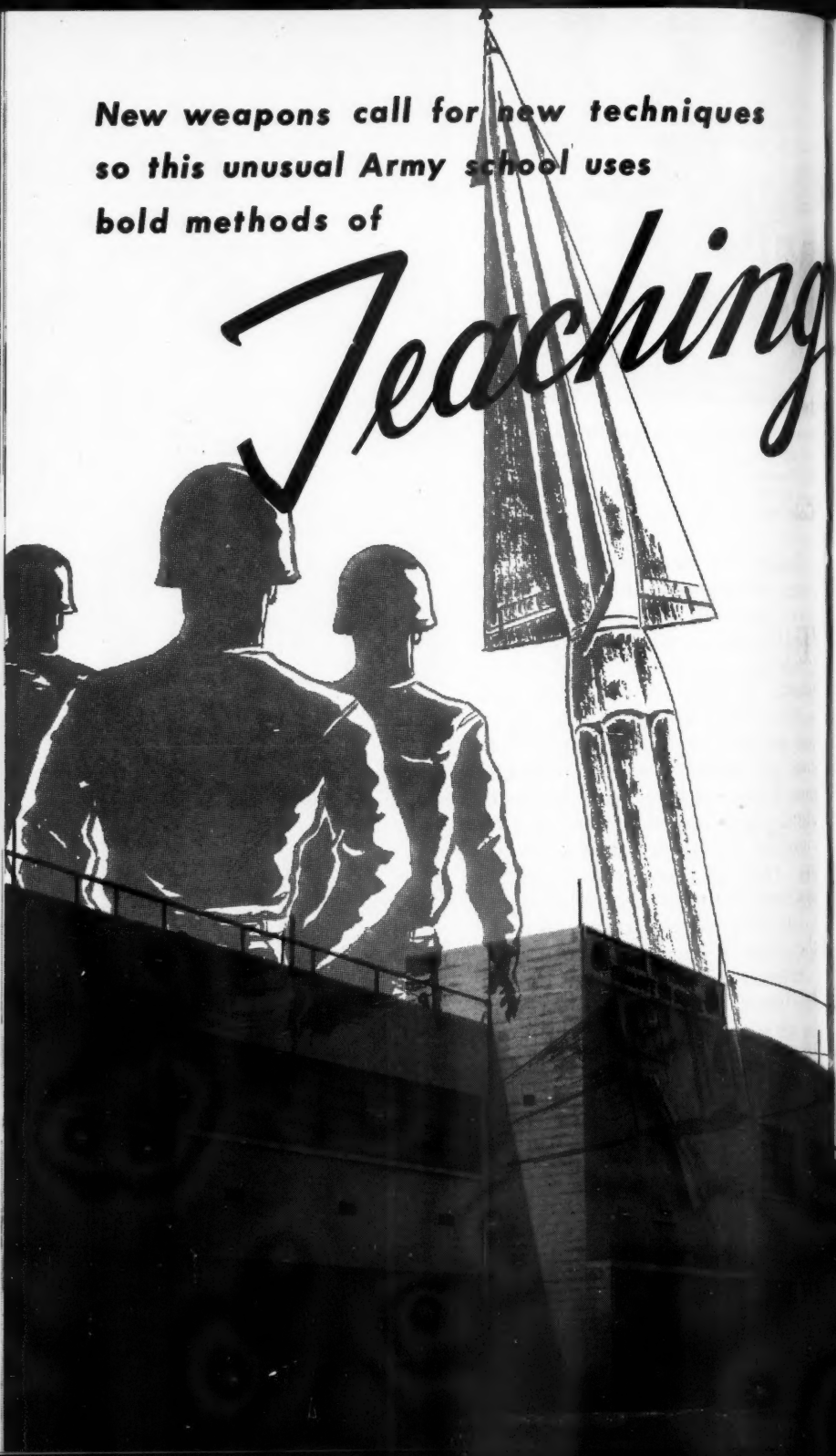
Whatever the cost in skill, sacrifice, time, and money, there must be no question of successfully continuing to meet and beat the Communist challenge in the field of military science and technology. Better to budget billions today than to be forced later to redeem in blood our priceless inheritance of security and freedom.



This is early test model of Pershing missile, long-range surface-to-surface weapon being developed to replace present Redstone.

New weapons call for new techniques so this unusual Army school uses bold methods of

Teaching



MISSILE MEN

twice as much in half the time

Colonel H. S. Newhall

THE Army Ordnance Guided Missile School at Redstone Arsenal, Alabama, recently unveiled a "classroom of the future" in a presentation that brought an audience of tough-minded, tax-paying business men to their feet cheering after a brisk demonstration of exciting new techniques now being applied to mass education in this age of missile technology.

In a fast-paced thirty minutes, the visitors

—viewed landmarks of their city by closed circuit television,

—watched mathematical formulae glowing in gemlike hues under "black light,"

—stared at seemingly conventional color slides that suddenly came alive before their eyes,

—guffawed while one of their fellows matched wits with an electronic "quiz box,"

—witnessed one of the infrequent public demonstrations of TV's social secret—the illuminated, moving script that sets the pace for TV speakers and narrators.

—saw a postage stamp magnified to the size of a highway billboard to show how small components can be studied by large classes through the use of big TV screens.

They saw ingenious applications of polarized light, the instantaneous projection of slides made before their eyes, the automatic dimming and turning up of classroom lights, and the well-cued activation

COLONEL H. S. NEWHALL, Ordnance Corps, now Chief of Military Organization and Training Branch, Office of Manpower, Office Chief of Ordnance, was Commandant, U. S. Army Ordnance Guided Missile School from 1955 to 1959.

of special effects of sight and sound designed to hold the attention of students who may not realize that twice as many of them are being taught twice as much in half the time required before the impact of missiles was felt upon technical training.

THE Missile School has been lacing its instruction with such ingenious techniques and devices and applied psychology for more than six years. It is the Army's only school devoted entirely to missile training. That fact, plus its geographical location at the Army's famous missile and rocket development center at Redstone Arsenal, has stimulated rewarding experimentation with new approaches to missile training.

The School began teaching its first class of seven officers in a ramshackle World War II ammunition loading structure back in 1953. Since then it has graduated almost 20,000 missile technicians from all branches of the U. S. forces and 12 Allied nations.

Now one of the largest technical training centers in the world, the School is a Class II activity of the Army Ordnance Training Command with Colonel Charles W. Eifler as Commandant. Its curriculum now includes more than 60 courses on aspects of seven missile systems—Nike-Ajax, Nike-Hercules, Corporal, Redstone, Lacrosse, Hawk and Jupiter.

By early 1960, the first classes will have opened on the Sergeant solid-propelled missile system that is scheduled to replace the Corporal. It has begun preparing for the first classes in the Pershing, also solid-propelled, which will supplant the famous Redstone.

Additionally, the Missile School undertakes special task assignments. This now includes instruction of squadrons of the U. S. Air Force on the "Old Reliable" Jupiter intermediate range ballistic missile developed by the Army and assigned for operation by the Air Force.

As a further mission, the School trains and activates Ordnance support units for world-wide deployment with tactical missile forces.

ONE of the School's missions takes it far beyond the academic and military training of missile technology, into a field where its methods and techniques can serve as valuable guideposts for civilian educators. That mission is to originate and keep up-to-date most of the textbooks, lectures, films and audio-visual aids used in missile training at the School and throughout the Department of the Army.

The School maintains a staff of traveling experts who check the progress of existing and future missiles through all stages of research, development, testing, manufacture and field operation. They send back a constant stream of first-hand data from design studios, testing laboratories, production lines, and launching pads located throughout the Free World.

Thus commences a painstaking process of compiling and communicating data to the minds of men in a way that will transform those who know little or nothing about missiles into skilled technicians, able to keep these new weapons in constant combat readiness.

For almost seven years now, there has poured from the Missile School

a torrent of instructional material that is steadily raising the level of knowledge of a subject of which most of mankind was ignorant only a short while ago. Correlation of this information is carried out by a Senior Educational Advisor, a Director of Training, a Research & Curriculum Division, a Training Support Division and Surface-to-Surface, Surface-to-Air, Officer and Unit Training Divisions.

Imagination and daring ingenuity have characterized the labors of these organizations year after year. The specialized abilities of experts from industry and education, artists and technical writers, producers and directors from commercial television, talented public speakers, actors, and even salesmen —all have been drawn upon to obtain the desired results.

Closed Circuit TV

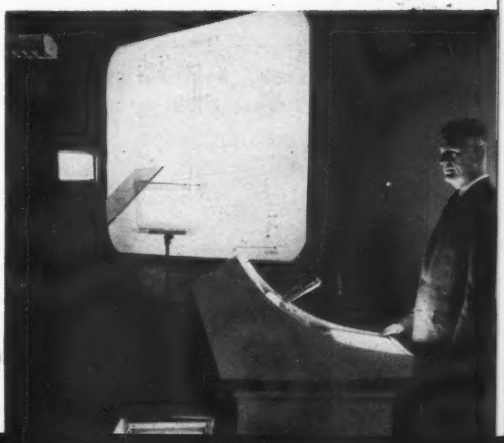
PERHAPS best-known of these efforts has been the use of closed circuit television and related group communications equipment. While other Army installations have been using television for internal instructional purposes under Signal Corps supervision, emphasis at OGMS has been on outside transmissions.

In October 1958, as a result of its experiments, the Missile School was given the assignment of transmitting a series of 25 two-hour courses in preventive missile maintenance to senior officers at the Armor School, Fort Knox, Kentucky, 280 miles north at Huntsville. These were the first such courses ever to be televised as well as the first the Army had sent via closed circuit TV over such a distance.

A striking innovation was use

Artist puts finishing touch on diagram, one of half million pieces of art and training material available as teaching aids.

New chart of a radar tube to be used as a training aid is examined above, while modern prompting device is tried out, below.



of a huge screen measuring 8 by 12 feet. In commercial television one two-hour program per month can require as much as six months of preparation. Yet with three per month slated for eight consecutive months, the Missile School was "on the air" within six weeks after the initial assignment was made.

To meet this deadline, consultants were called in, technicians were trained, essential equipment was acquired. Today studios at the School have 17 cameras, five mobile vans built upon standard Army trucks, and a collection of properties and special effects enabling programs to range over dozens of locations.

The first programs drew critical acclaim. In February 1959, the Secretary of the Army asked that one of the Fort Knox programs be simulcast to a Pentagon theater for viewing by some 500 key military and civilian officials.

Such was the professional quality of the program that in April 1959, the Army Chief of Information and Chief of Ordnance "sponsored" a special 45-minute live giant screen TV presentation, "Minds, Missiles and Men," to a capacity audience of newsmen at the National Press Club in Washington. Another special program, "Modern Weapons for a Modern Army," was sent to 2,500 delegates attending the fifth annual convention of the Association of the U. S. Army in Washington in August 1959.

Another significant program is to be transmitted this April to cadets of the U. S. Military Academy at West Point, New York.

Meanwhile, closed circuit television, as widely used at other Army installations, is being utilized as one of the instructional media in 25 different resident courses at the Missile School. In many instances, only portions of the courses are televised.

Plans are underway, however, to use closed circuit television in portions of all courses at the School as soon as feasible, thus making it an integral part of some 60 different courses. A total of 485 class subjects are now scheduled for preparation of television scripts on a systematically planned and scheduled basis.

The School is now considering the possibility of simulcasts to other training centers which require some missile instruction from time-to-time during their regular training schedules. Other studies are being made of the feasibility of using television to train National Guard and Reserve units over large areas, especially to advance the "One Army" concept.

Another interesting development involves the use of a moving script which is synchronized with many different electronically controlled sound effects, slides, moving screens, and "black" light—all controlled automatically.

In order to evaluate the effect of this teaching technique, the School established experimental and controlled groups for one of their most difficult courses—the Nike Acquisition and Computer Course. Although the control group had significantly higher exam scores in general mental ability, electronics aptitude, electrical information, mechanical aptitude and electronics as measured by standard achievement tests, it was found that when the experimental group received instruction by the new group com-

munications technique their scores equaled or even bettered the regular exam scores made by the control group.

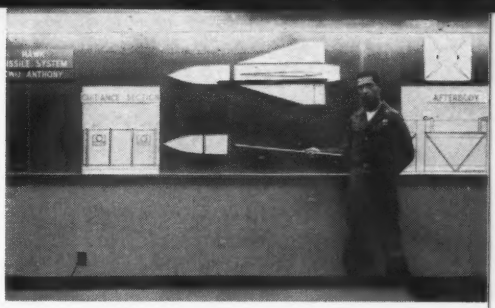
Widespread interest has been evinced by other military installations, industrial organizations and civilian educational institutions. During the past year, representatives from more than 50 different organizations have visited the School to see demonstrations of equipment and review the experimental procedures and results achieved to date.

Further refinement in educational television is augured by a recent experiment utilizing color television in missile training. A sixty-day study, under direction of the Army Signal Corps, has been instituted to determine whether color television can supplant black-and-white video in classroom instruction. If otherwise found satisfactory, use of color is expected to be of special value in teaching complicated circuitry and identification of small vari-colored missile parts.

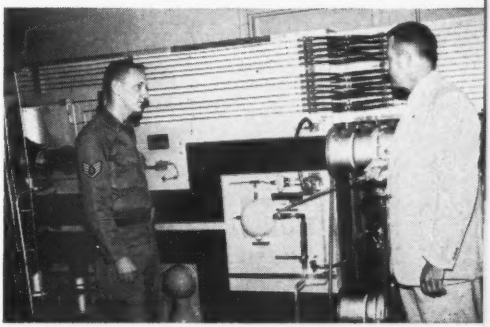
Instructional Aids

MARKING another innovation, the conventional moving, illuminated script used by television performers now enables missile instructors to hew to the line in their platform presentations, thereby saving time. Automatic rear screen projection of pertinent slides and charts is cued into prompting equipment so that as the instructor utters the key word, special effects are set in motion.

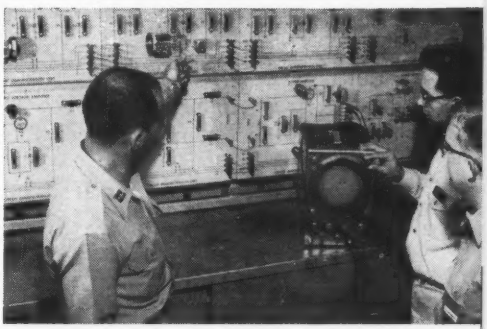
In another interesting technique known as "technamation," a combination of plastic slides with overlays is projected through a rotating disc of polarized glass. The re-



One of thousands of devices developed at the School, training aids demonstrating Hawk missile system glow under black light.



Symbolizing interservice character of the missile training center, a civilian instructor explains Jupiter to Air Force student.



Simplified model, above, aids in explaining intricate circuits. Instructor describes missile to students via television, below.

sulting light refraction produces animation effects.

An unusual device is a "quiz box"—a push-button device which gives an amusing "critique" of wrong answers while red lights flash. The student looking for correct trouble-shooting procedures with "Ord 6" test equipment is thus encouraged to examine each possibility before he presses the button to discover whether he is right or wrong.

Much familiar equipment is put to use in new ways. An office dictation recording device, for example, is especially useful to a student performing "laboratory work" alone. He listens to recorded step-by-step instructions, and if he is stuck on a procedure, he rewinds the belt and starts over again.

Working around noisy generators and equipment has led to wide use of telephone and radio headsets. A microphone relays the instructor's words, and an inter-com system enables the students to ask questions.

Standard magnetic tape recorders, using synchronized translations of the English audio track, have contributed to better understanding of training films by Allied students. This permits students whose English may be slow, to hear the lesson in their own language.

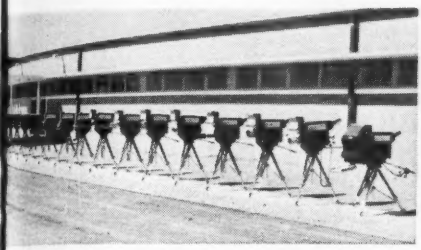
The new video tape technique that permits almost instantaneous recording and replaying of televised programs on plastic tape has already made substantial contributions to missile training. Because video tape can be so quickly made, edited, and replayed, it also is being used more widely in foreign-language instruction.

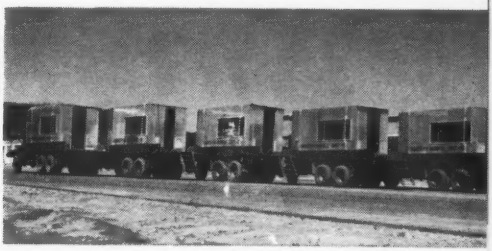
Video tapes have also been made of time-consuming operations, such as assembly and dismantling of complicated mechanisms. Thus a four-hour operation can be quickly edited for presentation in much shorter time. Video tape also facilitates instruction in extremely difficult subjects, such as removal of radar magnetron tubes, that otherwise could not be illustrated.

Other far-reaching improvements have been made by simply altering instructional situations. For example, one of the initial factors limiting the size of classes was the space available in Army control vans, which could accommodate only three or four men. By dismantling the equipment, placing appropriate antennae on the roofs

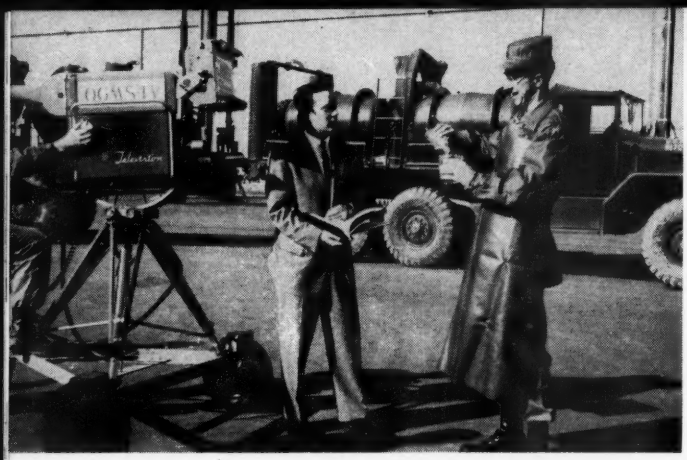
of class buildings and placing consoles in large classrooms, the size of classes could be increased to the seating capacity of the room itself. That capacity can now be further enlarged with the use of closed-circuit, giant screen television. The latter technique, incidentally, presents a possible means of coping with the enormous training problems that would arise from emergency mobilization.

ALL this diverse activity has increased the work load of the Training Support Division to a degree not envisioned by original planners. It must plan, lay out and





"Studios at the School have seventeen cameras, five mobile vans, and an extensive collection of properties and special effects."



Roving cameras can reach areas that would be difficult to demonstrate in a classroom, bring intricate procedures to the student.

handle production of hundreds of types of training aids, photographs and documents used by staff agencies of the Missile School and many other agencies. One file section now contains more than 500,000 pieces of art and master training material distributed around the world. Some of the files are in Greek, Chinese and other allied languages.

Unusual imagination is called for in attaining the goal of "easy understanding."

Highly classified models of equipment are constructed, cut-away, colored and often animated by electricity in a model shop which also makes simple aids such as pointers and rostrums.

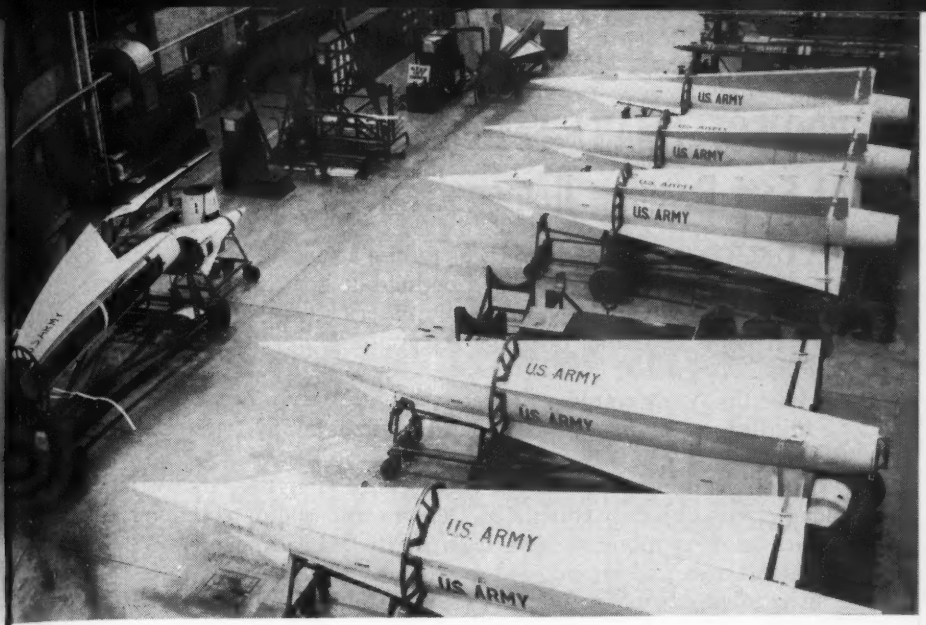
A battery of printing and reproduction equipment is now turning out in excess of 1,000,000 sheets of instructional material a month, ranging from offset sheets of text to large blueprints. There are also slides, transparencies, wall charts, outlines, diagrams of electronic schematics and the maze of circuits used in missile systems and their ground-handling equipment.

A book unit prepares training manuals written by educators and technical specialists in the Research and Curriculum Division.

TO CARRY out its assignments, the Missile School now draws approximately half of its instructors from the Signal Corps and contracts periodically with a dozen or more firms to obtain instructors, maintenance consultants and equipment as needed.

To train about 4,500 missile technicians from 13 nations in Fiscal Year 1960, the Missile School is conducting most of its classes on a two-shift-a-day schedule, with ballistic missiles being taught around the clock. It utilizes about

Electronic "quiz box" is used to teach students how to think through a series of related questions on equipment maintenance.



In these huge shop buildings students from all branches of the U. S. forces and a dozen allied nations learn the mechanics of new weapons, such as Nike air defense system.

650 instructors and 1,500 military and civilian staff members, a large number of whom are concerned with the physical chore of putting the missile equipment back together each midnight to dawn so that the next day's training can proceed without interruption.

Along with its academic activity, the School trains Ordnance support units for global deployment with tactical forces.

LOOKING to the immediate future, the Commandant, Colonel Eifler, sees giant screen closed circuit television as an increasingly valuable tool of education, particularly in exchanging information between various training centers. As an example, to facilitate the training of men who operate missile ground support equipment, portions of courses now given at the Ordnance School, Aberdeen Proving Ground, could be transmitted by closed circuit television to the Guided Missile School for use as required in ground equipment maintenance courses. The skills developed at other military schools can thus be exchanged, he believes, avoiding costly duplication of training personnel and equipment and yet making available the best of each to other training centers.

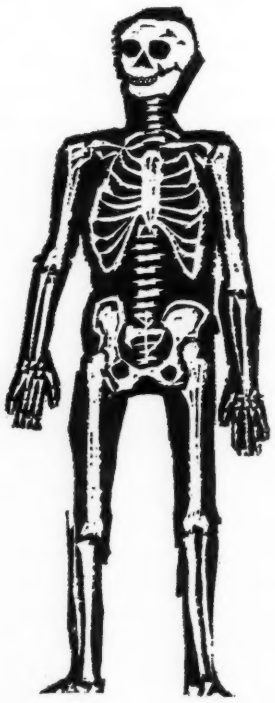
The efforts of the U. S. Army Ordnance Guided Missile School in the field of advanced technical education have placed it in the forefront of modern academic institutions. The recognized success of its new, modern, and sometimes revolutionary teaching techniques is due in large part to the dedication and enthusiasm of its staff—military, civilian and contractor—working as a team for the common goal of building a strong America by expanding man's technical knowledge in the new age of space.

PROJECT "MAN" Featured At Fort Benning Demonstration

A DEMONSTRATION to focus public attention on the Army Project Man (Modern Army Needs) will be held at Fort Benning, Georgia, 2 to 4 May 1960. Almost 200 items of materiel and equipment from the current Army inventory or under research and development will be demonstrated by ground combat troops. Guests will have an opportunity to see how the Army employs the latest scientific techniques and equipment in fulfilling its main mission of land combat in any type of war, limited or general.

Top Government executives, members of Congress, industrial leaders, members of the Department of Defense and senior commanders of all services and components have been invited. Leading news media representatives also will attend.

Scheduled events include a welcome, buffet and night exercise on 2 May, unveiling of a statue by the Secretary of the Army on 3 May, and demonstrations on 3 and 4 May.



Here is a secret
X-ray view
of one of our
thinking machines.

It's a very ancient model,
just about
as old as time.

No pushbuttons, no bells,
no clankity-clank,

But we've found that
if you feed it facts
and figures, and coffee
and a sandwich maybe;
and leave it alone
for a while . . .
there's no limit to what it can do.

Frankly, no mechanized model is
ever going to replace it.
Not around here, anyway.

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NEWS of professional interest

Big Slam-Puerto Pine

In the largest airlift exercise ever held in peacetime, some 20,500 troops and 11,000 tons of equipment were airlifted from United States bases to Puerto Rico and returned as part of Exercise Big Slam-Puerto Pine. The 15-day exercise staged in March tested mobility of the Strategic Army Corps (STRAC) who were joined by combat-ready troops of Utah National Guard and Pennsylvania Reserve. This marked the first time that Army Reserve units were involved in this type of exercise—a dramatic demonstration of the One Army concept.

Soldier Voting

Complete information on soldier voting, including all state requirements, has been issued by the Office of Armed Forces Information and Education. Titled *Voting Information* 1960, it is being distributed as Department of the Army Poster 21-50 to troop units world-wide.

Banyan Tree II

Five Latin American countries were invited to take part in March with the United States Army and the Air Force in Exercise Banyan Tree II, a major combined exercise simulating defense of the Panama Canal area. This was the first field maneuver in which the United States reserved tactical roles for ground and air units of other American Republics—Brazil, Chile, Colombia, Panama and Peru.

Lieutenant General Ridgely Gaither, USA, Commander in Chief, Caribbean, controlled all forces while they were in the Caribbean Command area. Approximately 5,000 men and 150 aircraft took part.

M-14 to 101st

Combat troops of the 101st Airborne Division, Fort Campbell, Kentucky, are receiving first distribution of the M-14 rifle, the Army's new weapon which fires ammunition interchangeable with those of other NATO nations. The M-14, replacing four weapons now in use, is expected to be in the hands of the entire division by the end of June. Deliveries to other units will begin soon.

Pershing Progress

Continued research and development on the Pershing ballistic missile system will proceed under terms of an $82,599,690 contract recently let by Department of the Army to the Martin Company, Orlando, Florida. The contract brings the total Pershing missile contract awards for Fiscal Year 1960 to $118,057,000.

The Pershing—a two stage, selective range, surface-to-surface ballistic missile system—is being designed as a tactical support weapon of extreme accuracy and high mobility. Static firing tests have been conducted and will continue. The Pershing program is under technical supervision of the Army Ballistic Missile Agency, Redstone Arsenal, Alabama.

Enlisted Collegians

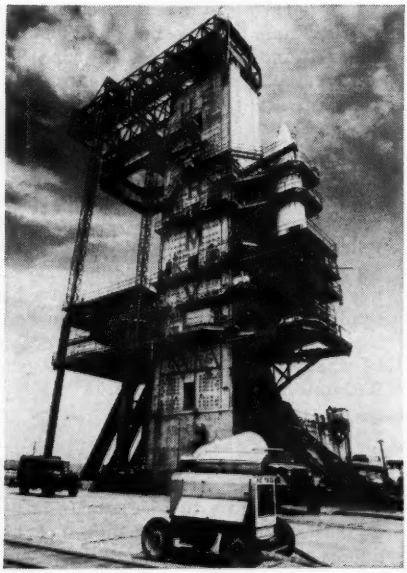
Four Army noncommissioned officers—first under the Army Enlisted College Training Program to graduate from Milwaukee School of Engineering—took high honors as they stood first, second, third

and sixth in their class which received diplomas in March. The Program, initiated in 1958, enables qualified enlisted career men and women to attend full-time college courses to improve their ability to perform Army jobs. Of the 120 enrolled under the program in 38 schools, the Milwaukee institution had the largest enrollment—31 soldiers.

Graduating at the head of the class with a degree of Associate in Applied Science was SFC Richard B. Luethje, Portsmouth, Virginia. The others in order were M/Sgt John W. Mahlman, Caldwell, Texas; M/Sgt Emmet C. Wilder, Cattaraugus, New York; and SFC Marvin P. Flowers, Heber Springs, Arkansas.

Communications Center

The Midwest Relay Station was recently dedicated as a new mid-continent link in the Army's world-wide communications network at Fort Leavenworth, Kansas. This newest and most modern strategic communications center is the second of three scheduled to go into service in the continental United States. The first at Davis, California, has been in operation since 1956, while the third now is being built at Fort Detrick, Maryland. The new station, capable of handling 200,000 messages a day to oversea commands, is operated by the United States Army Communications Agency.



Civilian Personnel Director

Mr. Charles F. Mullaly, Deputy Director of Civilian Personnel since November 1954, has been named to succeed Mr. Robert H. Willey as Director of Army Civilian Personnel. Mr. Mullaly is the first Director to be selected under the new Army Civilian Career Program.

Effective 1 February, Mr. Willey was appointed Administrative Assistant to Secretary of the Army Wilber M. Brucker. He succeeds John W. Martyn who retired following a civil service career which began in 1906 with the War Department.

All-Component Classes

Beginning with the next basic class conducted at the U. S. Army Infantry School, Fort Benning, Georgia, National Guardsmen will be interspersed with Regular Army men and Reservists in all classes, as is now the policy for advanced students. The new policy is in keeping with the One Army concept of the Department of Army.

ROTC Curriculum Revised

Beginning with the school year which starts this fall, advanced ROTC students will take about 20 percent of their military instruction in university-taught subjects, such as science, psychology, communications and political institutions. The new program is designed to stimulate increased intellectual attainment on the part of ROTC students, lessen training load, and make the overall program more attractive. Military subjects, such as crew-served weapons instruction, will be taught during the summer camp period.

MODIFICATIONS have been completed on this 175-foot high Saturn test tower at the Army Ballistic Missile Agency's Test Laboratory, Redstone Arsenal, Alabama. The huge tower, previously used in testing Redstone and Jupiter missiles, is designed for static firing of a massive, 1,500,000-pound-thrust Saturn booster which would serve as the first stage of a multi-stage space vehicle capable of placing heavy payloads into earth orbit or making a "soft" lunar landing.

Roll-on Roll-off Test

In recent tests, all necessary support items for an Army antiaircraft missile battalion in Germany were moved from Letterkenny Ordnance Depot, Chambersburg, Pennsylvania, and loaded aboard ships in 16 hours. This is regarded as a record for roll-on-roll-off methods, under which supplies are assembled at a depot, loaded on trailers, vans or trucks, transported by ship, then driven directly to the using organization. Such tactical movement of equipment is the culmination of years of planning to achieve direct support of troops in the field by the quickest methods.

All-Service Missile Training

Enrollment of a contingent of 8 officers and 58 enlisted members of the Marine Corps rounds out the representation of all Armed Services on the student body of the Army Ordnance Guided Missile School, Huntsville, Alabama. The student body also includes men from the Navy, Air Force and 12 allied nations as well as Army personnel, enrolled to study maintenance of the Hawk missile system.

CBI History Issued

The Office of the Chief of Military History recently announced publication of *Time Runs Out in CBI*, forty-sixth volume in the series "United States Army in World War II" and third in the subseries covering the China-Burma-India Theater of Operations. Authors are Charles F. Romanus and Riley Sunderland, who from 1946 to 1953 formed the CBI Section of the staff engaged in writing the history of the U. S. Army in World War II. The historical volume is on sale for $6.75 by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Ready Reservist Assignments

Action is being taken by Department of Defense to free essential Federal employees who also are members of the Ready Reserve from conflicting demands that might arise in a national emergency. As key employees of a Federal agency with a mobilization mission they have vital civilian duties, but as Ready Reservists they may be called to active military duty when their civilian agency needs them most. A screening operation endorsed by the Office of Civilian and Defense Mobilization now provides that each agency having mobilization functions will identify its key employees, then indicate how soon each can be made available for active duty in an emergency. Initial reports are due by 1 July. After screening, final determination of the individual's status will be made by the Secretary of the military department concerned.

MP Museum Seeks Items

A call has been issued to members of the Military Police Corps for materials or items that might fit into the newly opened museum of the Corps at the Provost Marshal General Center, Fort Gordon, Georgia. Present exhibits include displays of weapons confiscated by MP units, historical guidons and flags, counterfeiting equipment taken in oversea raids, portraits of prominent officers of the Corps, and plaques from the military police organizations of Allied governments.

Distillation Unit

In the first known application of aluminum for the purpose, an all-aluminum sea water distillation unit is being developed by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia. It is expected to be lighter, have greater capacity and establish better fuel economy than present models, which are made of cupro-nickel. An experimental all-aluminum unit now is undergoing engineer tests.

More Missile Masters

Nine additional Missile Master sites will be added to the air defense of the United States this year. Key areas to be protected by the electronic air defense coordinating system are Seattle, New York, Boston-Providence, Buffalo-Niagara, Chicago, Los Angeles, Pittsburgh, Detroit and Philadelphia. One system now is operational protecting the Washington-Baltimore area.

Missile Master was developed by the Signal Corps in cooperation with the Martin Company, Orlando, Florida, to

Back Cover

SECOND in a series of posters supporting Army Information objectives, DA Poster 355-5 is currently being distributed to Army units and organizations to advance the theme: "Keep Your United States Army Modern —That This Nation Shall Not Perish." The poster is scheduled for release world-wide to coincide with the Project MAN demonstration at Fort Benning, Georgia, 2 to 4 May, where modern equipment and ground combat techniques will be displayed before top-level representatives of government, defense, industry and press.

collect and analyze data on all aircraft, distribute the information to battery commanders, and coordinate fire of large Nike defenses.

Missile Master sites will be manned by units assigned to the U. S. Army Air Defense Command, and supported by Army Signal Corps troops. All sites will be tied into the overall North American Air Defense Command semi-automatic ground environment system (SAGE).

Redstone Firing

An Army unit temporarily returned from its base in Europe to perform the practice launching recently successfully fired a Redstone ballistic missile under tactical conditions at White Sands Missile Range, New Mexico. Battery "B" of the 40th Field Artillery Group (Redstone) is the same unit which on 2 June 1958 fired the Redstone for the first time inland.

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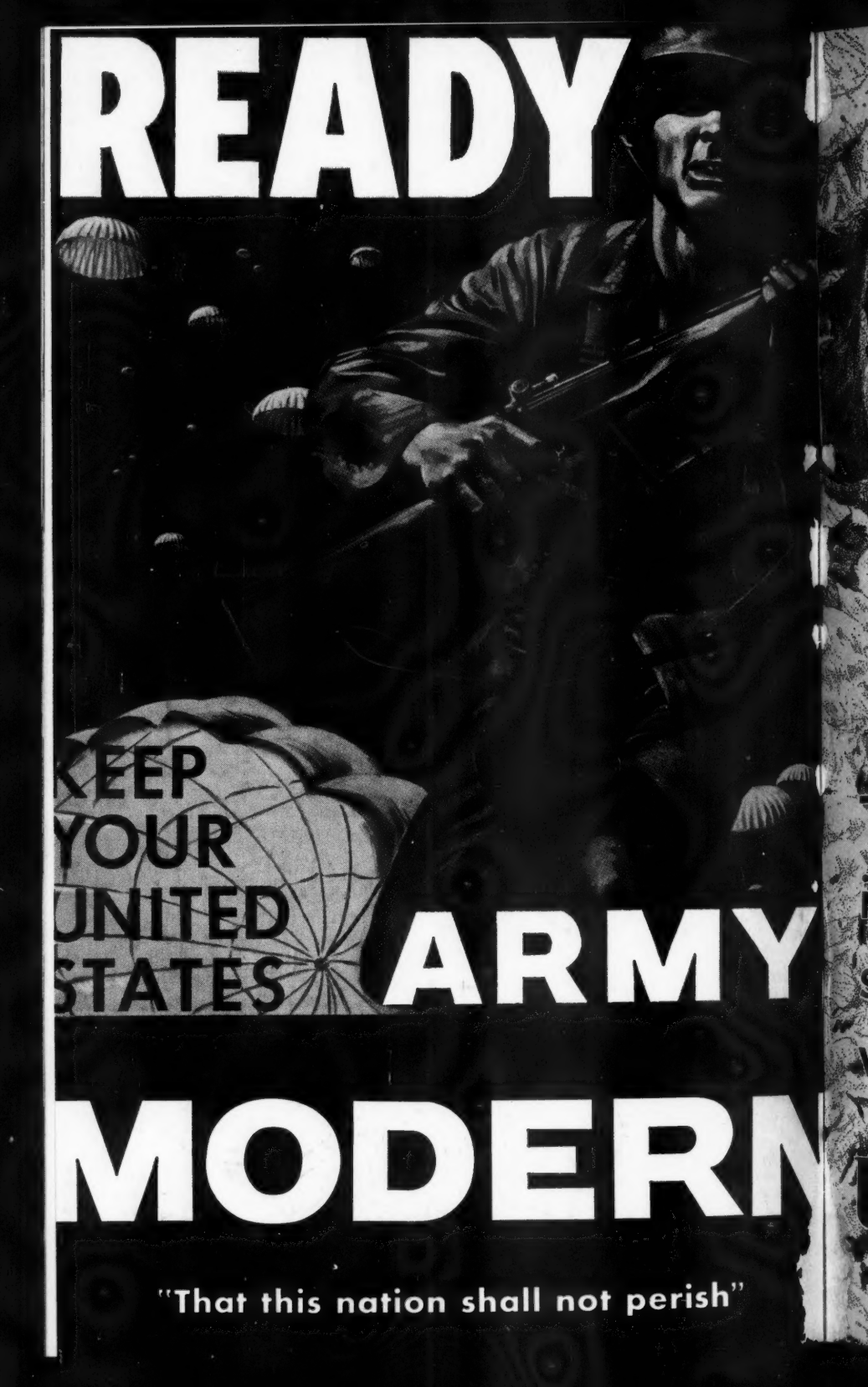
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